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SEA TURTLES AND THEIR MARINE
HABITATS AT TINIAN AND AGUIJAN, WITH
PROJECTIONS ON RESIDENT TURTLE
DEMOGRAPHICS IN THE SOUTHERN ARC
OF THE COMMONWEALTH OF THE
NORTHERN MARIANA ISLANDS

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Administrative Report H-01-06C

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COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS**

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PREFACE

This report provides the results of recent research efforts to ascertain the status and habitat use of sea turtles in the Commonwealth of the Northern Mariana Islands (CNMI). The work was sponsored by the Southwest Fisheries Science Center Honolulu Laboratory with funding awarded through the Office of Protected Resources, National Marine Fisheries Service. As noted by the author, a continuation of assessment and monitoring is essential to determining the overall status and dynamics of resident and breeding assemblages of sea turtles within the CNMI, as well as elsewhere in the insular U.S. Pacific islands. Incorporating local community involvement in survey, monitoring and tagging programs can serve as a valuable means to extend conservation ethic regarding sea turtles within the region.

Because this report was prepared by an independent investigator, its statements, findings, conclusions, and recommendation do not necessarily reflect the official views of the National Marine Fisheries Service, NOAA, U.S. Department of Commerce.

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EXECUTIVE SUMMARY

An assessment of resident sea turtles and their nearshore habitats at Tinian and Aguijan, Commonwealth of the Northern Mariana Islands (CNMI), was conducted from March 12-21, 2001. An estimated 351 individual *Chelonia mydas* were observed via 448 sightings in 27 surveys covering roughly 59% of Tinian's total shore and outer reef perimeter. Fourteen *Chelonia mydas* were observed during tow surveys covering 95% of Aguijan's shore and reef perimeter. No other turtle species were sighted. Juvenile turtles of various sizes dominated in all environments surveyed, and observations of turtles with estimated curved carapace lengths at or below 45 cm suggested recent and continuing recruitment at both Tinian and Aguijan. Projected turtle density and abundance was greatest along the relatively uninhabited eastern coast of Tinian. Twenty-four species of algae noted as green turtle forage in other regions of the world were identified at Tinian in this and previous surveys.

Projections of turtle densities and abundances based on data from recent surveys of four of the five CNMI southern arc islands suggest that the small uninhabited islands of Farallon de Medinilla and Aguijan sustain tens of turtles, turtle numbers around the larger inhabited islands of Saipan and Tinian range in the hundreds, while the CNMI portion of the southern arc (which includes Rota) likely supports between 1000 and 2000 resident green turtles. Turtle density and abundance appear highest at Tinian despite its smaller size relative to Saipan and its apparent lack of seagrass forage. A comparison of observed turtle species activities within the region suggests that the CNMI should presently be classified as primary resident green turtle habitat with a minor green turtle nesting component.

A continuation and expansion of assessment and monitoring is essential to determining the status and dynamics of both resident and breeding populations of turtles within the CNMI. Similar to Saipan, numerous sites along Tinian's shoreline stood out as candidate areas for capturing and tagging large numbers of turtles given appropriate methods and oceanic conditions. It is recommended that visual surveys of the islands continue, and that a tag and release program, focusing on both research and management, be initiated. Incorporating community involvement in tagging and monitoring programs could serve as a means to extend a conservation ethic regarding sea turtles within the region.

1. INTRODUCTION

The distribution and status of sea turtles at many Pacific island localities has yet to be determined but is of concern as continuing human expansion and coastal development throughout the region has great potential to negatively impact local sea turtle populations through increased harvests, incidental catch, and the degradation of nesting and critical nearshore and pelagic habitats (see Lutcavage et al. 1997, Bjorndal 1997). The lack of specific island and archipelago information hinders efforts to understand not only local, but also the large-scale regional dynamics of turtle populations, and reduces the ability to effectively plan development and human activities to minimize impacts and to manage sustainable utilization of turtles as a resource.

Recent efforts to investigate and document turtle activities within the Commonwealth of the Northern Mariana Islands (CNMI; McCoy 1997, Pultz et al. 1999, Kolinski et al. 1999, 2001, Dollar and Stefasson 2000) are providing baseline information that is relevant to estimating and understanding turtle demographics within the region. Such information is likely to be key to decision makers and managers as island populations and tourist development expands, and local public and political interest in gaining legal exemption under the U.S. Endangered Species Act to allow for traditional harvests of sea turtles continues (see McCoy 1997). Although far from complete, evidence to date suggests very limited turtle nesting on CNMI shores (Pritchard 1977, 1982, Johannes 1986, Wiles et al. 1989, 1990, Grout 1997, McCoy 1997, Pultz et al. 1999, Kolinski 2001). Anecdotal reports of turtles in nearshore environments exist (Pritchard 1977, 1982, Johannes 1986, Wiles et al. 1989, 1990, McCoy 1997), however concentrated assessments of the resident sea turtle population(s) are presently few (Pultz et al. 1999, Kolinski et al. 1999, 2001, Dollar and Stefasson 2000, Kolinski this study).

This study was commissioned to expand the focus on assessing the status of resident turtles and their habitats within CNMI waters. Data specific to the islands of Tinian and Aguijan are presented, and a summary of available information from known surveys within the region was used to construct a projection of present day turtle demographics for islands within the southern arc of the archipelago.

2. STUDY AREA

The Mariana Archipelago has 15 islands and various submerged banks and is oriented poleward from 13° to 20°5'N and 144.5° to 146°E (Figure 1). The Philippine Sea borders the western shores and the Pacific Ocean in the east. The islands are located on two separate arcs. An inner, northern arc supports the volcanically active or recently active islands of Farallon de Pajaros (Uracas), Maug, Asuncion, Agrihan, Pagan, Alamagan, Guguan, Sarigan and Anatahan (the Northern Marianas). Islands on the frontal, southern arc are capped or surrounded by limestone terraces and include Farallon de Medinilla, Saipan, Tinian, Aguijan, Rota and Guam (the Southern Marianas; Wells and Jenkins 1988, Birkeland 1997). The archipelago is divided politically between the territory of Guam and the Commonwealth of the Northern Mariana Islands (CNMI), both United States affiliates. Approximately 61,000 humans inhabited the CNMI as of 1995, with more than 99% found in the Southern Marianas, the vast majority living on Saipan (McCoy 1997).

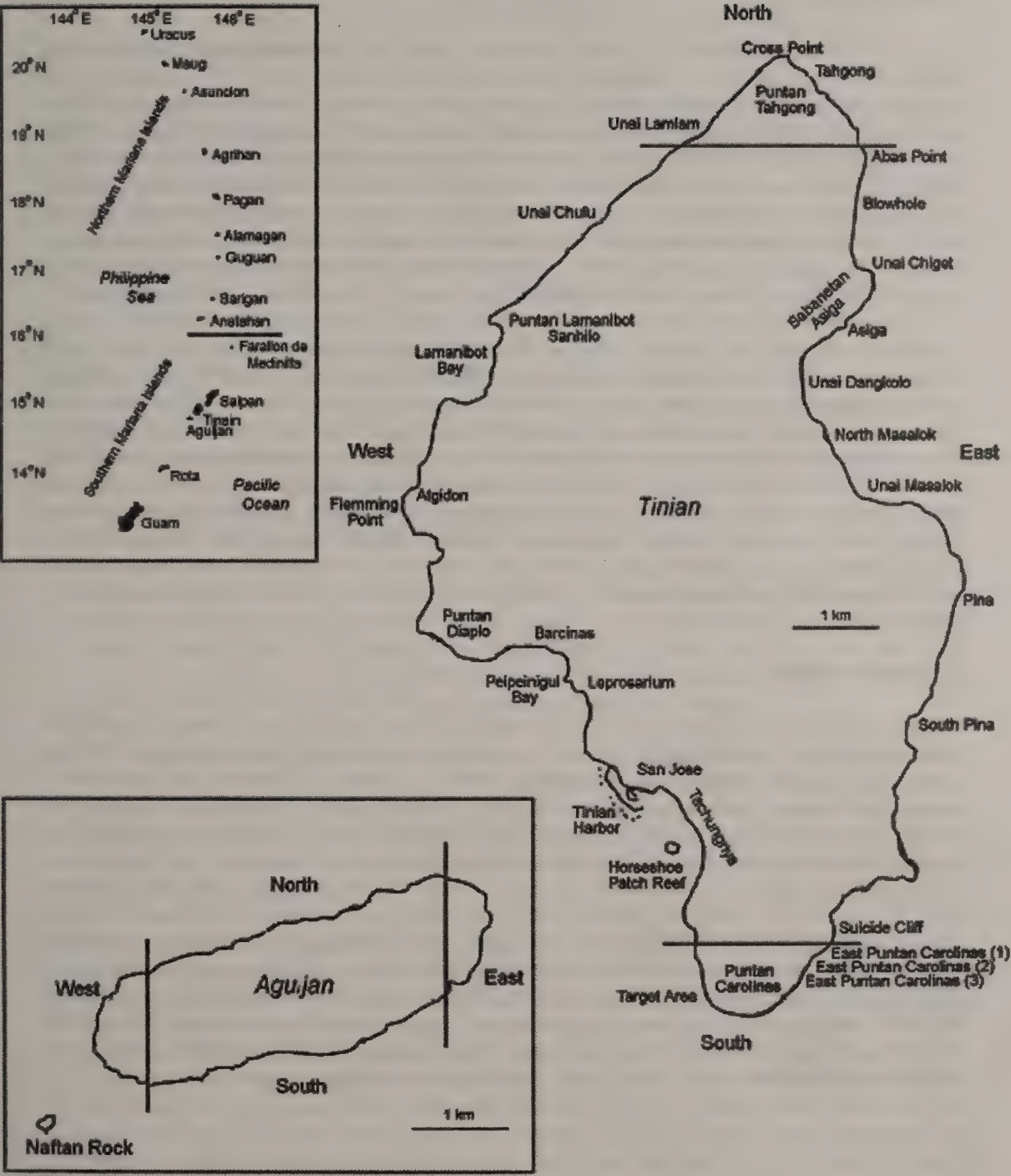


Figure 1: The Mariana Archipelago and Tinian and Aguijan Islands, CNMI.

2.1 Tinian Island

Tinian (15°00'N, 145°38'E) is a raised, relatively flat, 102 km², limestone island reaching heights of 170 m (Figure 1; Eldredge 1983, Wells and Jenkins 1988). It is located 5 km southwest of Saipan and 9 km northeast of Aguijan. The majority of shoreline consists of low to high limestone cliffs with sea-level caverns, cuts, notches and or slumped boulders, commonly bordered by intertidal benches (Doan et al. 1960, Eldredge and Randall 1980, Eldredge 1983). Thirteen beach districts have been defined (Pultz et al. 1999), 10 at west coast locations and three (one distinct and two discontinuous beach complexes) along the east coast. Beach deposits consist mainly of medium to coarse grain calcareous sands, gravel and rubble interspersed amongst exposed limestone rock (Doan et al. 1960). All beaches reportedly support turtle nesting activities (Wiles et al. 1989, Pultz et al. 1999).

The north, east, and south coasts have very limited fringing or apron reef development that is most conspicuous at Unai Dangkolo (Doan et al. 1960, Eldredge and Randall 1980, Maragos 1985). Submarine topography appears mainly characterized by limestone pavement with interspersed coral colonies and occasional zones of submerged boulders. Coral reef development is more prevalent at various west coast locations, with fringing coral reef habitats present inside Lamanibot and Peipeinigul Bays (Eldredge and Randall 1980, Maragos 1985) and a patch and small barrier reef system (altered as a breakwater for the harbor) located within the Tinian Harbor area (Doan et al. 1960, Eldredge and Randall 1980, Eldredge 1983, Maragos 1985). Human development is concentrated mainly along the west coast at San Jose. Roughly 3000 residents inhabited the island as of 1995 (McCoy 1997). Tourism and agriculture are the main industries.

2.2 Aguijan Island

Aguijan (14°51'N, 145°34'E) is a raised, steeply cliffed, 168 m high, nearly flat-topped limestone plateau approximately 7.2 km² in size located roughly 9 km southwest of Tinian (Figure 1; Eldredge 1983, Wells and Jenkins 1988). Its nearest neighbor to the southwest is Naftan Rock (1 km), and beyond that to the south is Rota (90 km). There are no beaches and bench development is limited (Eldredge and Randall 1980). Submarine topography is characterized by steeply sloping limestone pavement with scattered boulders and limited coral development around most of the island (Tsuda et al. 1971, Eldredge and Randall 1980, Maragos 1985, Randall 1985, Wells and Jenkins 1988, pers. obs.). Along the east coast an 18 m deep pavement platform extends roughly 300 m offshore and contains scattered corals, grooves and sand deposits. Along the west coast a topographically diverse platform connects Aguijan to Naftan Rock. This platform is characterized by limestone rock, live coral and sand, and reaches depths of from nine to 18 m. There is no permanent human settlement on the island, however the nearshore waters are regularly fished. A Japanese founded cement dock and stairway are present on the west side of the island. Island access requires government permit approval.

3. METHODS

3.1 Sea Turtle Assessments

Methods for turtle and marine habitat assessments are similar to those described in Kolinski et al. (2001). The marine nearshore environments of Tinian were surveyed from March 12-21, 2001 by investigators of the University of Hawaii, the Saipan Division of Fish and Wildlife and the Tinian Department of Land and Natural Resources. Aguijan was surveyed on March 20, 2001. Various members of the community, including Department of Land and Natural Resources representatives, local fishermen and other local observers, provided information regarding notable sea turtle habitat believed worthy of investigation (which included most of the marine habitat surrounding Tinian Island). Approximately 59% of Tinian's, and 95% of Aguijan's outer reef and shoreline perimeter was examined using one or more of the following three methods:

1. Tow surveys were conducted along portions of the north, south, and the majority of the west coast of Tinian and all of Aguijan as permitted by oceanic conditions. Two boats (a 31-ft. fountain and a 14-ft. whaler) were used to survey parts of the north and west regions of Tinian. Two to three people were towed in back of each boat, with the whaler surveying shallower environments maintaining distances from shore approximately 20 to 100 m, and the fountain surveying deeper environments 30 to 50 m offshore of the whaler. When a turtle was sighted the boat was stopped and the species, size, activity, time, depth, and habitat characteristics were relayed to a recorder on the boat. Latitude and longitude were noted at the location where each turtle was encountered using a Garmin hand-held GPS unit (only one GPS unit was available). In addition, boat observers searched the water's surface for turtle ascents, which were also recorded. Communication of turtle sightings between boats ensuring multiple reports of individual turtles did not occur. Aguijan and part of southern Tinian were surveyed in a similar manner using only the 31-ft. fountain.
2. In a single snorkeling survey four observers swam an imaginary transect along the perimeter of a Tinian patch reef maintaining observer distances of approximately 10 m in a straight line perpendicular to the transect. Turtle species, size, activity, time, depth, and habitat characteristics were relayed to a single person for recording on underwater writing paper. Latitude and longitude at the beginning and end of the transect were measured using a Garmin hand-held GPS unit.
3. Shoreline surveys of nearshore waters were conducted mainly along the northeast, east, and southern coasts of Tinian which were inaccessible to the water-based methods. Observers sketched the shoreline and prominent submerged benthic features within their range of visibility. When a turtle was sighted on the surface or swimming subsurface, the time was noted and binoculars were used to identify species and estimate size. Features such as tail length and any identifying marks were recorded when observed. The estimated surface time and behavior of each turtle was noted when possible, and the location and/or route of each turtle was plotted on the map sketch and numbered. The location of each observer was measured using a Garmin hand-held GPS unit. Environmental conditions and location factors deemed relevant were recorded.

Actual numbers of turtles were estimated for each transect by adjusting for resightings on the basis of unique features, time and specific locations and/or routes. These data were used to calculate estimates of total turtle abundance for each island by multiplying the mean number of turtles per kilometer from surveyed regions by total kilometers in similar non-surveyed areas, and then summing for each island. Estimates from single boat tow surveys were adjusted using a correction factor determined from multiple boat tow surveys (average percent increase in turtles from deep water tows). Total island estimates were made for the four surveyed CNMI southern islands (Kolinski et al. 1999, Dollar and Stefansson 2000, this survey). These estimates were used to make a general projection on present turtle abundance in the CNMI portion of the southern arc.

3.2 Assessment of Potential Sea Turtle Forage

Algae and seagrass samples were collected as a means to identify potential green turtle forage along five established west and east coast transects and from various areas along the south and west coasts of Tinian where assessable. Samples were not collected from Aguijan due to time and safety concerns. All specimens were identified by Jennifer E. Smith, Department of Botany, University of Hawaii at Manoa, Honolulu, Hawaii. In addition, a literature review was conducted and a species list of potential green turtle forage was compiled, along with locations and references. Hirth (1997) was utilized as a guideline for listing only those species identified as turtle forage in other parts of the world. Potential food resources of other turtle species were not surveyed.

4. RESULTS

4.1 Sea Turtles in Nearshore Environments

Site descriptions, notes on accessibility, methodologies, personnel, sources of information, raw data on turtle observations and estimates, and conclusions and recommendations for each transected location at Tinian and Aguijan are presented in the Appendix.

4.1.1 Tinian

An estimated 351 individual *Chelonia mydas* were observed via 448 sightings in 27 surveys covering roughly 59% of Tinian's approximately 54.6 km of total shore and outer reef perimeter (Table 1). No other turtle species were sighted. Sixty-nine percent (242 turtles) of the turtles were juveniles, 17% (61 turtles) were categorized as juvenile/adult, and 11% (40 turtles) appeared to be of adult size. Size determinations could not be made for eight (2%) of the turtles. Numbers of turtles categorized by size and general location are shown in Figure 2. Juveniles predominated along all coastlines. The proportion of adults to other turtles was greatest along the south (14%) and west (13%) coasts. A minimum of 11 juveniles with estimated curved carapace lengths (CCL) below 45 cm were observed, suggesting recent recruitment to the resident population.

Seven percent (24 turtles) of the turtles were observed at northern locations, 38% (134 turtles) at east coast sites, 17% (58 turtles) along the south coast, and 38% (135 turtles) within west coast

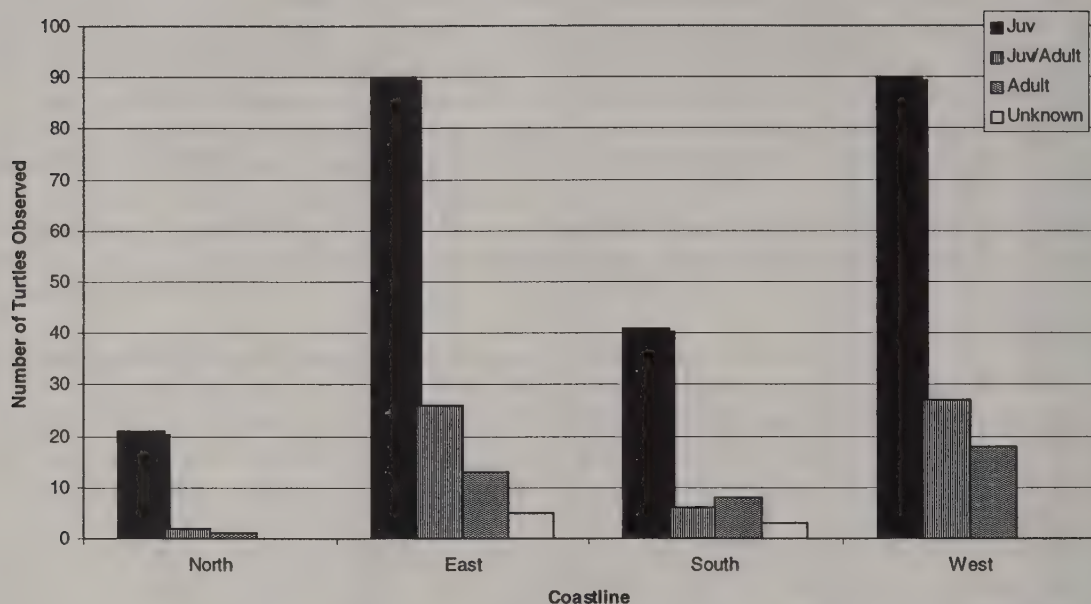


Figure 2: Estimated number of green turtles observed at Tinian Island categorized by size and location.

habitats. Total projected numbers of turtles per kilometer for the entire perimeter of each region are shown in Table 2. Projected turtle densities along the east coast appear to be nearly 1.5 times that of the south, twice that of the north, and 4.5 times that of west coast habitat. Other than general differences in wind and current exposure (Jones et al. 1974) and the presence of a small barrier and patch reef and limited port and human development along the west coast, no major habitat differences were noted between island regions. Survey techniques did, however, differ between regions (Table 1). The total number of green turtles inhabiting Tinian's nearshore environments is projected to be approximately 833 turtles.

Table 2: Projected green turtle densities and abundance for Tinian Island.

Region	Total Perimeter (km)	Estimated No. Turtles Observed	Perimeter Surveyed (%)	Mean Projected No. Turtles / km	Total Projected No. Turtles
North	4.35	24	73.3	13.9	60
East	20.90	134	22.8	26.6	555
South	4.50	58	54.4	17.1	72
West	24.83	135	88.7	5.9	145
Total:	54.58	351	59.4	15.3	833

Actual numbers of turtles observed and estimates of turtles per kilometer for each transect suggested multiple high density turtle areas including Puntan Tahgong and Tahgong at north Tinian, all east sites surveyed (with the possible exception of Blowhole and Unai Masalok), East Puntan Carolinas (1), Target Area at Puntan Carolinas and the Target Area to N14°56.149 at south Tinian, and the reef area outside of Tinian Harbor, Leprosarium and Barcinas, and Puntan Lamanibot Sanhilo, west Tinian (Table 1). The potential for tagging turtles in each area is

considered in the Appendix. In general, hand capture of turtles by experienced fishermen appears feasible for most high-turtle-density areas. Tangle nets might be successfully employed in the inner harbor. The vast majority of Tinian's coastline is fished regularly by spear-fishermen day and night. Nighttime work may increase catch success.

4.1.2 Aguijan

Fourteen individual *Chelonia mydas* were observed at Aguijan during tow surveys covering approximately 95% of Aguijan's roughly 12.6 km of total shore and outer reef perimeter (Table 3). No other turtle species were observed. Twelve of the 14 turtles (86%) were juveniles and the remaining two turtles (14%) were classified as adults. Six of the turtles were very small with at least two having estimated CCLs below 45 cm. Twenty-nine percent of the turtles were located on both north and east sides of the island (4 turtles each), while 21% (3 turtles each) were encountered in south and west side environments.

Table 3: Observations of green turtles, *Chelonia mydas*, at Aguijan Island, CNMI.

Region	Date	Max. Time (hrs:mins)	Method	Transect Length (km)	Number of Observations				Turtles per km
					Juv./	Juv.	Adult	Adult	Total
North	03/20/01	1:07	Tow	3.69	4	0	0	0	4
East	03/20/01	0:44	Tow	2.56	2	0	2	2	4
South	03/20/01	0:57	Tow	3.63	3	0	0	0	3
West	03/20/01	0:22	Tow	2.16	3	0	0	0	3
Total:		3:10		12.03	12	0	2	2	14

Total projected numbers of turtles per kilometer for the entire perimeter of each region of Aguijan are shown in Table 4. Both observed and projected turtle densities are low and differ little between general island regions. The total number of green turtles inhabiting Aguijan's nearshore environment is projected to be approximately 19 turtles.

Table 4: Projected green turtle densities and abundance for Aguijan Island.

Region	Total Perimeter (km)	Estimated No. Turtles Observed	Perimeter Surveyed (%)	Projected No. Turtles / km	Total Projected No. Turtles
North	3.69	4	100	1.5	5
East	2.56	4	100	2.1	5
South	3.63	3	100	1.1	4
West	2.76	3	78.3	1.8	5
Total:	12.64	14	95.2	1.5	19

4.1.3 Summaries and Projections for Surveyed Southern Mariana Islands

Presuming limited migration between islands has occurred, 543 individual green turtles have been observed in surveys of four of the CNMI southern arc islands between 1999 and 2001 (Table 5). Overall, juvenile turtles have accounted for 67% of the turtles observed, juvenile/adults for 18%, and adult-sized turtles for 12%, with sizes of three percent of the turtles remaining unclassified. Juveniles have dominated in all island surveys and their relative proportions are significantly negatively correlated with total island and reef perimeter (Pearson's

$r = -0.9672$, $P = 0.0328$; see Table 6 for perimeter estimates). The proportion of adult-sized turtles was below 15% for all islands and was not significantly related to island and reef circumference (Pearson's $r = 0.4809$, $P = 0.5191$).

Table 5: Size distributions of green turtles, *Chelonia mydas*, at surveyed CNMI southern arc islands.

Island	No. Turtles	Percentage of Turtles Observed				Reference
		Juv.	Juv./ Adult	Adult	Unknown	
Farallon de Medinilla	9	100	0	0	0	Dollar and Stefansson (2000)
Saipan	169	60	22	12	6	Kolinski et al. (1999, 2001)
Tinian	351	69	17	11	2	This study
Aguijan	14	86	0	14	0	This study
Total:	543	67	18	12	3	

Total projected numbers of turtles per kilometer for the entire perimeter of each island are shown in Table 6. Projected densities and abundances are highest for the large islands of Tinian and Saipan and are exceedingly low for Aguijan and Farallon de Medinilla. Turtle densities at Tinian are estimated to be twice that of Saipan and an order of magnitude greater than those of Aguijan and Farallon de Medinilla. The estimated abundance of Tinian turtles is 1.5 times that of Saipan, 44 times that at Aguijan and 83 times that at Farallon de Medinilla. Island and reef perimeter are not significantly correlated with projected turtle densities (Persons $r = 0.7240$, $P = 0.2760$) or abundance (Pearson's $r = 0.8673$, $P = 0.1327$). A total of 1436 green turtles are estimated to inhabit nearshore environments of the surveyed southern arc islands. Suggested resident population structures based on projected abundances and size distributions are presented in Figure 3.

Table 6: Projected green turtle densities and abundances at surveyed CNMI southern arc islands. Calculations for Farallon de Medinilla and Saipan based on data from Dollar and Stefansson (2000) and Kolinski et al. (1999, 2001).

Island	Total Perimeter (km)	Estimated No. Turtles Observed	Perimeter Surveyed (%)	Projected No. Turtles / km	Total Projected No. Turtles
Farallon de Medinilla	6.7	9	94.6	1.5	10
Saipan	75.2	169	47.7	7.6	574
Tinian	54.6	351	59.4	15.3	833
Aguijan	12.6	14	95.2	1.5	19
Total:		543			1436

4.2 Relevant Algae and Seagrasses Identified in Tinian's Nearshore Environment

A compilation of data from this and previous marine plant and algae surveys indicated the presence of at least 24 species of algae that have been identified as green turtle forage in other parts of the world (Table 7). Eleven (46%) of the species are Chlorophytes, three (13%) are Phaeophytes, and 10 (42%) are Rhodophytes. Eight (33%) of the species were located at east coast survey areas, one species (4%) at a south coast site, and 22 (92%) were noted along the west coast.

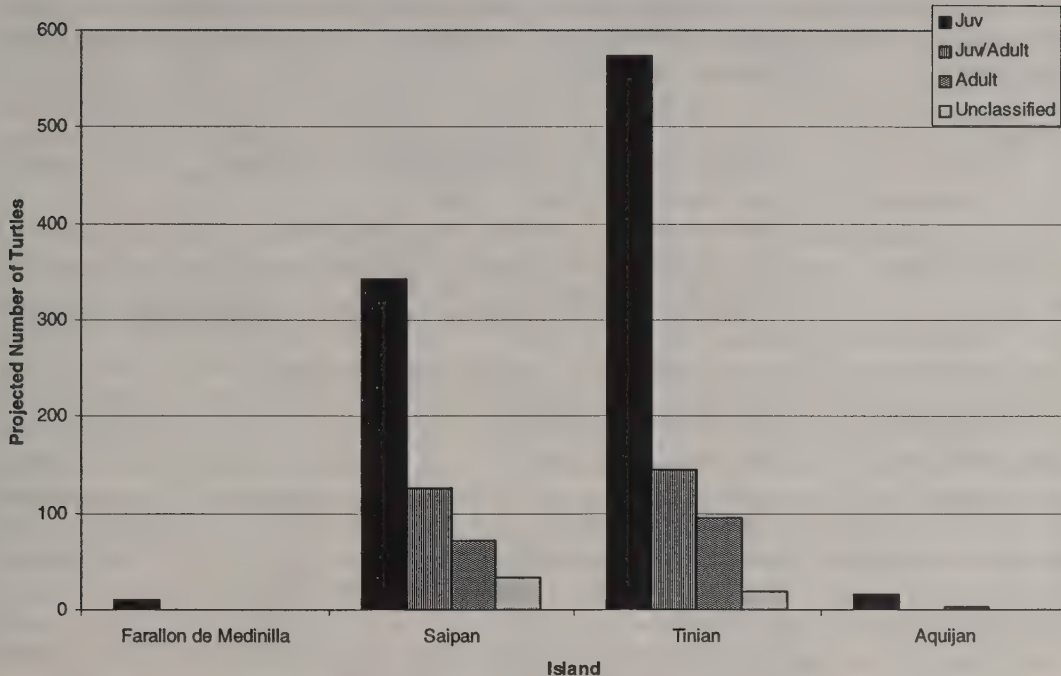


Figure 3: Projected population structures of *Chelonia mydas* at surveyed CNMI southern arc islands.

The presence of seagrasses in Tinian's nearshore environment is limited. Small beds of *Enhalus acoroides* exist in the narrow embayment at Unai Chiget (Eldredge and Randall 1980, pers. obs.; see also Fosberg et al. 1987 and Tsuda and Kamura 1990). *Halophila minor* was identified in localized patches inside Tinian/San Jose Harbor by Jones et al. (1974, see also Maragos 1985, Tsuda and Kamura 1990). However, neither species is reported by Hirth (1997) to have been identified as material ingested by green turtles.

Pertinent literature examined (Jones et al. 1974, Gilbert 1978, Itono 1980, Tsuda and Wray 1977, Tsuda et al. 1977, Eldredge and Randall 1980, Tsuda 1981, Fosberg et al. 1987, Tsuda 1988, Tsuda and Kamura 1990, Sonoda 1990) made no reference to marine plant and algae species which likely serve as green turtle forage in Tinian's north and south coast nearshore areas. Algae were collected from none of the north coast transects, and only one south coast site in this survey. No listings of relevant algae collections from Aguijan were found.

5. DISCUSSION

5.1 CNMI Turtles

Of the four species of turtles (*Chelonia mydas*, *Eretmochelys imbricata*, *Dermochelys coriacea*, and *Lepidochelys olivacea*) reported from CNMI waters (Pritchard 1982, NMFS & USFWS 1998a, 1998c), only *Chelonia mydas* has been observed in recent surveys (Pultz et al. 1999, Kolinski et al. 1999, Dollar and Stefansson 2000, Kolinski this study). Although the absence of

Table 7: Tinian marine algae that are listed by Hirth (1997) as green turtle forage (¹ = Jones et al. 1974; ² = Jones et al. 1974 with location identified by R. Tsuda pers. comm.; ³ = Sonoda 1990; ⁴ = present study.)

Classification	Location and Reference
Chlorophyta	
<i>Bryopsis pennata</i>	Horseshoe Patch Reef ³ , Tachungnya region ³ , West Tinian
<i>Caulerpa cupressoides</i>	Unai Chiget ⁴ , Unai Dangkolo ⁴ , East Tinian Tachungnya region ³ , Peipeinigul Bay ¹ , West Tinian
<i>Caulerpa racemosa</i>	Unai Dangkolo ^{1,4} , Unai Masalok ⁴ , East Tinian Puntan Carolinas Target Area ⁴ , South Tinian Horseshoe Patch Reef ^{3,4} , Inside San Jose Harbor ^{1,4} , Peipeinigul Bay ¹ , Atgidon ² , West Tinian
<i>Caulerpa sertularioides</i>	Inside San Jose Harbor ¹ , Peipeinigul Bay ¹ , West Tinian
<i>Caulerpa urvilliana</i>	Unai Dangkolo ¹ , East Tinian
<i>Codium arabicum</i>	Cave Beach ² , West Tinian
<i>Codium edulae</i>	San Jose Harbor Entrance ⁴ , Barcinas Region Peipeinigul Bay ⁴ , Puntan Lamanibot Sanhilo ⁴ , West Tinian
<i>Dictyosphaeria cavernosa</i>	Puntan Masalok ² , East Tinian Inside San Jose Harbor ¹ , Atgidon ² , Unai Chulu ⁴ , West Tinian
<i>Dictyosphaeria versluysii</i>	Unai Dangkolo ¹ , East Tinian Horseshoe Patch Reef ³ , Tachungnya region ³ , Outside San Jose Harbor ¹ , Peipeinigul Bay ¹ , Atgidon ² , Lamanibot Bay ¹ , West Tinian
<i>Ulva lactuca</i>	Tachungnya region ³ , West Tinian
<i>Valonia aegagropila</i>	Tachungnya region ³ , West Tinian
Phaeophyta	
<i>Hydroclathrus clathratus</i>	Inside San Jose Harbor ¹ , West Tinian
<i>Padina australis</i>	Unai Chiget ⁴ , East Tinian
<i>Turbinaria ornata</i>	Horseshoe Patch Reef ³ , Peipeinigul Bay ¹ , Atgidon ² , Unai Chulu ⁴ , West Tinian
Rhodophyta	
<i>Acanthophora spicifera</i>	Unai Dangkolo ⁴ , East Tinian Inside San Jose Harbor ⁴ , West Tinian
<i>Amansia glomerata</i>	Atgidon ² , West Tinian
<i>Centroceras clavulatum</i>	Tachungnya region ³ , Peipeinigul Bay ¹ , West Tinian
<i>Champia parvula</i>	Outside San Jose Harbor ¹ , Unai Chulu ⁴ , West Tinian
<i>Gelidiella acerosa</i>	Horseshoe Patch Reef ³ , Tachungnya region ³ , West Tinian
<i>Halymenia floresia</i>	Atgidon ² , West Tinian
<i>Hypnea cervicornis</i>	Horseshoe Patch Reef ³ , Tachungnya region ³ , Inside San Jose Harbor ¹ , Outside San Jose Harbor ¹ , Lamanibot Bay ¹ , West Tinian
<i>Leveillea jungermannioides</i>	Unai Chiget ⁴ , Unai Dangkolo ^{1,4} , East Tinian San Jose Harbor Entrance ⁴ , Unai Chulu ⁴ , West Tinian
<i>Spyridia filamentosa</i>	Inside San Jose Harbor ^{1,4} , Atgidon ² , West Tinian
<i>Tolypocladia glomerulata</i>	Outside San Jose Harbor ¹ , Peipeinigul ¹ , West Tinian

observations of hawksbill turtles is discouraging given their highly endangered worldwide status (NMFS & USFWS 1998b), there is no evidence to suggest this species occurred in high numbers in this region in the past (McCoy 1997, Kolinski et al. 2001, see also Wiles et al. 1990). While green turtles may be common to CNMI southern arc waters, hawksbills should be classified as extremely rare. Leatherback presence within the region is pelagic and transient (NMFS & USFWS 1998c), and olive ridleys are presumed to be waifs (see NMFS & USFWS 1998d).

The findings at Tinian and Aguijan correspond well with reported local observations of relative turtle abundance and distributions (see Appendix). However, it is important to impress that error associated with the estimates and projections in these surveys is difficult to ascertain without replication of transects, strict comparisons of differing methodologies and determination of error associated with each method in different habitats. Undoubtedly, the estimates presented would benefit greatly if combined with long-term tagging studies. Nevertheless, some understanding of turtle demographics within the region is gained. In general, the small uninhabited islands of the CNMI southern arc appear to support tens of turtles, turtle numbers around the larger inhabited islands range in the hundreds, while the CNMI portion of the southern arc (which includes Rota) likely supports between 1000 and 2000 resident turtles. Estimates of turtle numbers in the remainder of the archipelago, including Guam, Rota and islands of the northern arc are lacking (Rota has recently been surveyed and preliminary numbers appear to correspond fairly well with present projections, Larry Ilo, pers. comm.). Resident turtles (Prichard 1982, Eckert 1991, McCoy 1997, Jacinto Taman, Saipan DFW Fisheries Officer, pers. comm.) and various types of potential forage (e.g. Tsuda 1969, 1981, 1982, 1988, Tsuda and Tobias 1977a, 1977b, Tsuda and Wray 1977, Tsuda et al. 1977, Fosberg et al. 1987, Randall and Smith 1988, Smith et al. 1989, Tsuda and Kamura 1990) have been noted at these localities.

The predominance of juveniles at each of the four islands is interesting and in need of further investigation through direct tagging and measurement of turtles. The structure of resident populations in other areas of the world varies and includes populations which are overwhelmingly juvenile, those which are well mixed, and some which are primarily adult (reviewed by Hirth 1997). The absence of equitable numbers of adults in this survey may reflect size-age-survivorship relationships, migration of breeding adults to distant home rookeries, and/or differential distributions of size classes amongst the islands. Anatahan Island, for example, has been reported to host predominantly large green turtles (Jacinto Taman, Saipan DFW Fisheries Officer, pers. comm.). Observation of turtles estimated to be below 45 cm in CCL suggests recent recruitment to the Tinian and Aguijan turtle population(s). A predominance of juveniles of various sizes supports a conclusion of recurrent recruitment.

A comparison of turtle distributions within and between Tinian and Saipan (see Kolinski et al. 2001) in relation to the types of forage available, in combination with direct observations of turtle feeding at Tinian (Appendix) and reported seagrass and relevant algae distributions within the CNMI (e.g. Tsuda 1969, 1981, 1982, 1988, Jones et al. 1974, Tsuda and Tobias 1977a, 1977b, Tsuda and Wray 1977, Tsuda et al. 1977, Fosberg et al. 1987, Randall and Smith 1988, Smith et al. 1989, Tsuda and Kamura 1990, Sonoda 1990, Kolinski et al. 2001) strongly suggests that marine algae act as the predominant source of nutrition for the majority of green turtles within the region (note: the extent of animal matter in CNMI green turtle diets is, perhaps wrongly, presumed to be minimal; see Bjørndal 1997, Hirth 1997). Although migration to west

Saipan or Guam seagrass pastures is possible, such activity by high numbers of turtles would undoubtedly be observed and no reports of such have been encountered. In addition, studies on resident turtles in other Pacific populations suggest long-term site fidelity to local resting and foraging areas having sizes on the order of two to tens of kilometers squared (Balazs 1980, 1982, Balazs et al. 1987, Limpus et al. 1994, Musick and Limpus 1997). Diets consisting primarily of algae are quite common for green turtles in other areas of the world (reviewed by Mortimer 1982, Bjorndal 1997, Hirth 1997). This doesn't, however, negate a role for seagrasses in CNMI green turtle ecology. Examination of the stomach contents from a single deceased turtle located in Tanapag lagoon on Saipan's west shore found nearly 100% of the locally abundant seagrass *Halodule uninervis* with only trace elements of the algae species *Acanthophora spicifera* and *Acrochaetium* sp. (identified by Dr. Dennis J. Russell, American University of Sharjah, United Arab Emirates). In addition, examination of cropped blades in *Halodule uninervis* pastures in Garapan lagoon Saipan suggested green turtle feeding (pers. obs.). A potential to migrate to alternative habitats with growth (see Hirth 1997) may mean that, over time, various turtles may be in a position to utilize CNMI seagrass resources. Bjorndal (1997) indicates that the adaptation of gut microbial communities to either algae, seagrass, or some combination of both may influence diet selection but is not likely to overwhelm optimal foraging strategy. Turtles likely feed on what is locally available, and distributions of turtles may be driven primarily by availability and proximity of suitable foraging and resting habitats (see Balazs et al. 1997), the conditions of which may be subject to change with time.

It is presently difficult to explain the contrast between the inhabited islands of Saipan and Tinian with regards to observed and projected turtle densities and overall abundance. Saipan is the center of tourism, manufacturing and development within the CNMI, with a resident human population roughly 18 times larger than that of Tinian (McCoy 1997). In general, assessments on both islands (Kolinski et al 1999, Kolinski this study) found turtle densities to be greatest along the east coasts, corresponding with relatively low levels of human access and development. Turtle poaching occurs on both islands (McCoy 1997). A human relationship to turtle densities is thus suggestive. However, a finer scale examination of island distributions shows high turtle abundance and density just outside of Tinian Harbor, reports of turtles within the harbors of both islands, and a suggested relationship between turtle distributions and topographical complexity (vertical relief) of the benthos along the west coast of Saipan (Kolinski et al. 1999, 2001). In addition, low numbers and densities of turtles at the uninhabited islands of Farallon de Medinilla and Aguijan suggest additional factors, perhaps food availability, habitat preference, predator concentrations, and possibly relative exposure to recruitment may act to determine distributions and thus may confound any potential relationship which exists between levels and types of human development and nearshore turtle abundance. Yet even Farallon de Medinilla (a military bombardment range) and Aguijan (reportedly subject to turtle poaching) are not immune from human disturbance. Unfortunately, the number of inhabited islands surveyed within the region is too few. Full-scale assessments of resident turtles in the remaining islands of the southern arc (Rota and Guam), as well as inhabited islands in the northern arc (Anatahan, Alamagan and Agrihan) may provide the data necessary to statistically examine regional human and turtle density relationships

The size of the resident population(s) at Tinian and Saipan greatly contrasts with the number of turtles believed to nest within the region (Wiles et al. 1989, Pultz et al. 1999, Kolinski et al. 2001). Given the suggested status of all turtle species in the area, the suggestion that Rota

supports few nesting turtles (Wiles et al. 1990, McCoy 1997), and that beaches on Farallon de Medinilla and islands of the northern arc may be unsuitable for turtle nesting (Dollar and Stefasson 2000, McCoy 1997), the CNMI as it relates to turtles might presently be classified as primary green turtle foraging habitat with a minor green turtle nesting component. Such classification in no way diminishes the importance of CNMI nesting habitat or its potential to support other turtle species, but it does highlight a direction for future investigative focus.

The criteria for delisting a sea turtle species from protected status for any geographic region covered under the U.S. Endangered Species Act of 1973 mandate an extensive understanding of local and regional turtle abundances, dynamics, and habitat characteristics including carrying capacities and habitat stabilities (see NMFS & USFWS 1998a, McCoy 1997). Repetition and expansion of surveys focusing on resident turtles and their habitats throughout the CNMI will thus be critical to determining the CNMI's status with regards to resident green turtle "recovery." Localized concentrations of green turtles at Tinian and Saipan (Kolinski et al. 1999) appear accessible and high enough to support long-term investigative research in the dynamics of local abundance, growth rates, food preference and utilization, local and long-range migration, and identification of the genetic structure of the resident turtle population(s). Access to the majority of the remaining CNMI islands, however, may limit monitoring of turtle status in the remainder of the archipelago to infrequent short-term surveys. Additional habitat assessments will be necessary to estimate food abundance and carrying capacity for all islands within the CNMI. These suggested processes will require a long-term commitment of funding and expertise, but may begin to address the current concerns of local residents: many of whom would like to see turtle numbers remain or increase, but who also dislike the legal prohibition on access to turtles as a resource, especially given that prohibition appears to have been based (whether rightly or wrongly) on a very anecdotal understanding of local availability.

5.2 Recommendations

The potential for broadening sea turtle research efforts within the CNMI is immense. The resident turtle population is large and appears concentrated enough at Tinian and Saipan to allow for viable tag and release efforts. Institutions at Saipan (Division of Fish and Wildlife) and Tinian (Department of Land and Natural Resources, Department of Public Safety) possess facilities, boats, some equipment, and the interest necessary to initiate and support an expansion of research on turtles within the region. Given the preliminary findings and projections on resident turtle status at southern arc islands, the need for confirmation of findings, an assessment of dynamics, and in-depth investigations of habitat characteristics including food abundance and estimates of carrying capacities, the lack of knowledge concerning turtle population status and dynamics at northern arc islands, and continued local interest in reinitiating traditional usage of turtles as a resource, it is recommended that additional research on sea turtles be conducted in this region. More specific recommendations are listed below (note: recommendations for each transected area are located in the conclusion sections of the Appendix).

1. Continue monitoring of resident sea turtles using the methods and locations identified in this and previous surveys on at least a quarterly basis to confirm preliminary findings, determine variability, and establish peak times of abundance. Expand to other island areas if possible.

Long-term monitoring of island transects are needed to estimate population stability and dynamics.

2. Conduct benthic surveys along the north, east, and south coasts of Tinian and the east coast of Saipan using tow, snorkel and or SCUBA methods. Describe identified sea turtle resting habitats and collect marine plant and algae samples for identification.
3. Initiate tag and release efforts at high density turtle areas identified in this and previous surveys. Deploy tangle nets where feasible and monitor appropriately.
4. In addition to multiple tagging and measuring, small pieces of hind-flipper should be collected from captured turtles, stored in salt preservative, and sent for genetic analysis.
5. Captured turtles should be examined for lesions and lesion biopsies taken and sent for histological analysis.
6. Attempts should be made to collect and identify ingested forage from both captured and stranded turtles.
7. A full-scale investigation of algae and seagrass distributions and abundances for all CNMI nearshore environments is warranted to estimate food availability and potential green turtle carrying capacities.
8. On site training by individuals experienced with the equipment and techniques needed to carry out the above recommendations will be necessary.
9. Paid involvement of local fishermen and turtle poachers in tag and release efforts will allow for utilization of their water skills and an opportunity to share a conservation ethic.
10. All above efforts should be expanded to include resident sea turtle populations on other islands within the archipelago, with an initial focus directed towards the islands of Rota, Anatahan, Alamagan, Agrihan and Guam. Tag and release of turtles in neighboring island habitats will allow for elucidation of potential turtle movements between islands and regional assessments to be made.
11. Continue monitoring of Tinian and Saipan nesting beaches with a focus on recording crawl activity and obtaining adult/hatchling tissue samples for genetic analysis. Initiate a nesting turtle monitoring program on Rota, and interview residents of inhabited northern arc islands to document local knowledge concerning potential nesting activities of turtles at northern arc islands.
12. Coordinate with agencies on green turtle nesting islands throughout Micronesia and the western Pacific in an effort to collect tissue from breeding turtles/hatchlings for genetic analysis. Genetic profiling of regional breeding and resident populations is key to identifying source sink relationships and thus elucidating potential population impacts across political

boundaries. Such information may provide the basis for international cooperation in turtle research and management for coastal areas in the western Pacific.

13. Technical assistance with data base establishment and maintenance is warranted.
14. Establish funding sources for long-term monitoring of sea turtles in this region. Potential funding sources include the local governments, the U.S. Federal Government, the South Pacific Regional Environmental Programme, and various private organizations.

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APPENDIX

SITE DESCRIPTIONS, ACCESSIBILITY, SOURCES OF INFORMATION, AND RAW DATA

Date: 03/15/01
Type: Tow
Location: Puntan Tahgong to Lamiam, North Tinian

Site Description:

Shoreline is characterized by low rocky limestone (roughly five meters above sea level) and narrow intertidal benches, with the exception of Unai Lamiam where medium to coarse grain sand, rubble and rock is present. Limited shallow water reefs and boulder zones extend roughly 10 to 25 m offshore. Limestone pavement with scattered corals and boulders slopes to depths exceeding 18 m roughly 125 m offshore and 37 m approximately 300 m offshore. Accumulated benthic sand deposits are found within the Unai Lamiam region. Green turtle nesting at Unai Lamiam has been reported (Wiles et al. 1989, Pultz et al. 1999). No stream entrances observed within the region. Swell one to two meters. Winds brisk. Visibility 35 plus meters. Limited photos available.

Access:

The area is easily accessible by boat with estimated travel time from San Jose approximately 45 minutes (DPS 31 ft. Fountain). Land access to the Cross Point area is described elsewhere. Unai Lamiam was not approached by land in this survey, but presumably can be reached by car along a paved and then gravel/grass road. A short hike is likely required. Land access to the shoreline between these points is restricted and requires hiking from either point or swimming in from a boat.

Description of Methodology:

Two boats (31 ft. Fountain and a 14 ft. whaler) were used in this survey. Two people were towed in back of each boat, with the whaler surveying shallower environments maintaining distances from shore approximately 50 to 100 m, and the Fountain surveying deeper environments 50 m offshore of the whaler. When a turtle was sighted the boat was stopped and the species, size, activity, time, depth and habitat characteristics were relayed to a recorder on the boat. Latitude and longitude were noted at the location where each turtle was encountered using a GPS unit (only one GPS unit was available). In addition, boat observers searched the waters surface for turtle ascents. Communication of turtle sightings between boats ensured multiple reports of individual turtles did not occur.

Personnel: Ray Aldan, Gus Dusalua, Henry King, Alfonso Reyes, Don Reyes, Elvin Masga, Jesse Pangelinan, Larry Ilo, John Manglona, Frank Rasa, Steve Kolinski

Source of Information:

This location was suggested by Gus Dusalua (DPS Fire Rescue, Fisherman) who reported seeing turtles from cross point south both east and west while fishing. Green turtle nesting at Unai Lamiam has been reported (Wiles et al. 1989, Pultz et al. 1999).

Type: Tow

Observers: Ray Aldan, Jesse Pangelinan, Alfonso Reyes, Larry Ilo, John Manglona

Location: Puntan Tahgong to Lamiam, Deep Transect

Tide: Medium rising, 2 days before half moon (neap) towards new.

Time	Lat.	Long.	Error Obs.		No.	Species	Size	Activity	Depth (m)	Habitat	Notes
			(m)								
10:09	15°06.056	145°38.432	11.6		1	Gn	Juv	Swimming	30	Hardpan, sand	START: Just of Cross Point. Lamiam area. STOP: End transect south of Unai Lamiam.
10:40											
10:54	15°05.079	145°37.498									
Tot. Time (hrs:mins)			Obs.	Species	Size	Estimated Number of Turtles Observed		Transect			
0:45			1	Gn	Juv	1	Gn	2,450	Turtles per km	0.4	

Type:	Tow									
Observers:	Gus Dusalua, Don Reyes, Elvin Masga, Frank Rasa, Steve Kolinski									
Location:	Puntan Tahgong to Lamiam, Shallow Transect									
Tide:	Medium rising, 2 days before half moon (neap) towards new.									
			Error	Obs.						
			(m)	No.	Species	Size	Activity	Depth (m)	Habitat	Notes
Time	Lat.	Long.								
10:09	15°06.056	145°38.432	11.6							START: Just of Cross Point.
10:42	15°05.322	145°37.901	4.0							Lamiam area.
10:53	15°05.148	145°37.617	3.7							
10:54	15°05.079	145°37.498								STOP: End transect south of Unai Lamiam.
Tot. Time (hrs:mins)	Obs. Species		Size	Estimated Number of Turtles Observed		Transect Length (km)		Turtles per km		
0:45	0			0		2.450		0.0		
Summary:										
Max. Time (hrs:mins)	Tot. Obs.	Species	Size	Total Estimated Number of Turtles Observed		Tot. Transect Length (km)		Turtles per km		
0:45	1	Gn	Juv	1		2.450		0.4		

Conclusion: In contrast to expectations based on local observations, only one turtle was observed along this northwest transect. This may be due to a number of factors including (1) our inability to survey further inshore due to swell conditions (cliffline surveys along the north and northeast coasts found the vast majority of turtles inhabiting reef edge environments which are close to shore) and/or; (2) the potential movement of turtles within the region (local observations occurred mainly at night on different dates). Additional surveys covering different hours, moon, tide phases and months are needed to determine variability and establish peak times of abundance. Efforts to tag turtles within this area are not recommended at this time.

Date: 03/16/01
Type: Cliffline
Location: Puntan Tahgong (Cross Point), North Tinian

Site Description:

Five cliffline stations spread to the southeast of Cross Point. Low lying convoluted limestone shoreline two to three meters above sea level. Narrow intertidal bench extends up to five meters in some areas. Reef evident to 40 plus meters. Benthic features beyond the reef edge could not be viewed. Map bathymetry suggests a steep drop-off beyond the reef reaching 32 m depth roughly 150 m from shore and 166 m depth approximately 330 m from shore. No stream entrances noted within the region. Ocean conditions rough with swell 1.2 m and winds brisk. Photos available.

Access:

A paved road leads north towards Puntan Tahgong. A right turn off onto a wide, well trimmed grass road leads to Cross Point at the northern tip of the island. Travel time by car from San Jose estimated at 35 minutes. A three minute hike across limestone is necessary to reach the low lying nearshore cliffs. Travel time by boat (31 ft. DPS Fountain) approximately 45 minutes.

Description of Methodology:

Cliffline observers sketched the shoreline and submerged benthic features within their range of visibility. When a turtle was sighted on the surface or swimming subsurface, the time was noted and binoculars were used to identify species and estimate size. Features such as tail length and any identifying marks were recorded when observed. The estimated surface time and behavior of each turtle was noted when possible, and the location and/or route of each turtle was plotted on the area map sketch and numbered. The location of each observer was measured using a Garmin handheld GPS unit. Environmental conditions and location factors deemed relevant were recorded.

Personnel: Henry King, Don Reyes, Elvin Masga, Jesse Pangelinan, Larry Ilo, John Manglona, Frank Rasa, Steve Kolinski

Source of Information:

This location was suggested by Gus Dusalua (DPS Fire Rescue, Fisherman) who reported seeing turtles from cross point south both east and west while fishing.

Location:	Puntan Tahgong (1)					Lat.	15°06.060	Long.	145°38.688	(+/- 4.3 m)	
Observer:	Larry Ilo										
Time	Obs. No.	Species	Size	Notes	Tide:	Medium rising, 1 day before half moon (neap) towards new.					
9:40				START							
11:05				STOP							
Tot. Time	Obs.	Species	Size	Estimated Number of Turtles Observed	Transect						
(hrs:mins)					Length (km)						
1:25	0			0	0.060						
					Turtles per km						
						0.0					

Location:	Puntan Tahgong (2)					Lat.	15°06.053	Long.	145°38.709	(+/- 8.5 m)	
Observer:	Elvin Masga, Frank Rasa										
Time	Obs. No.	Species	Size	Notes	Tide:	Medium rising, 1 day before half moon (neap) towards new.					
9:50				START							
9:55	1	Gn	Juv	Approx. 55 cm surface 15 m from shore for 5 secs.							
10:00	2	Gn	Juv	Approx. 55 cm surface 10 m from shore. Swimming.							
10:02	3	Gn	Adult	Approx. 110 cm surface 10 m from shore for 50 secs. Sex unknown.							
10:14	4	Gn	Juv	Approx. 50 cm surface 12 m from shore for 20 secs. May be turtle # 2.							

Puntan Tahgong (Cross Point), North Tinian

Time	Obs. No.	Species	Size	Notes	Estimated Number of Turtles Observed	Turtle Length (km)	Turtles per km
10:43	5	Gn	Adult	Approx. 100 cm surface 18 m from shore for 35 secs. Sex unknown. May be turtle # 3.	3	0.060	66.7
10:55	6	Gn	Juv	Approx. 70 cm 18 m from shore for 6 secs.	1		
11:05				STOP	4		
Tot. Time (hrs:mins)							
1:15							

Location: Puntan Tahgong (3) Lat. 15°06.028 Long. 145°38.741 (+/- 4.3 m)

Observer: Don Reyes, Jesse Pangelinan Notes: Tide: Medium rising, 1 day before half moon (neap) towards new.

Time	Obs. No.	Species	Size	Notes	Estimated Number of Turtles Observed	Turtle Length (km)	Turtles per km
9:45	1	Gn	Juv	START	1	0.060	16.7
10:50				Approx. 50 cm surface 18 m from shore.			
11:15				STOP			
Tot. Time (hrs:mins)							
1:30							

Location: Puntan Tahgong (4) Lat. 15°06.003 Long. 145°38.765 (+/- 5.2 m)

Observer: John Manglona Notes: Tide: Medium rising, Neap

Time	Obs. No.	Species	Size	Notes	Estimated Number of Turtles Observed	Turtle Length (km)	Turtles per km
9:50	1	Gn	Juv	START	1	0.060	16.7
10:25				Approx. 60 cm surface 15 m from shore for 2 mins.			
11:20				STOP			
Tot. Time (hrs:mins)							
1:30							

Location: Puntan Tahgong (5) Lat. 15°05.977 Long. 145°38.790 (+/- 4.3 m)

Observer: Steve Kolinski Notes: Tide: Medium rising, 1 day before half moon (neap) towards new.

Time	Obs. No.	Species	Size	Notes	Estimated Number of Turtles Observed	Turtle Length (km)	Turtles per km
9:58	1	Gn	Juv	START	1	0.060	16.7
10:07	2	Gn	Juv/Adult	Approx. 60 cm surface 20 m from shore in surf for 10 secs.			
10:10	3	Gn	Juv	Approx. 70 - 80 cm surface 28 m from shore. Swimming.			
10:11	4	Gn	Juv	Approx. 45 - 50 cm surface 25 m from shore off reef edge for 10 secs.			
10:28	5	Gn	Juv	Approx. 50 - 60 cm surface 30 m from shore outer edge of wash. May be turtle # 1 or # 2.			
11:00				Size? Surface 25 m from shore for 55 secs.			
11:15				STOP			

Tot. Time
(hrs:mins)
1:17

Turtles
per km
66.7

Transect
Length (km)
0.060

Obs.	Species	Size	Estimated Number of Turtles Observed		
			Juv	Gn	Juv
4	Gn	Juv	3		
1	Gn	Juv/Adult	1	Gn	Juv/Adult
5	Gn		4	Gn	

Summary:
Max. Time
(hrs:mins)
1:30

Turtles
per km
33.3

Tot. Transect
Length (km)
0.300

Tot. Obs.	Species	Size	Total Estimated Number of Turtles Observed		
			Juv	Gn	Juv
10	Gn	Juv	8		
1	Gn	Juv/Adult	1	Gn	Juv/Adult
2	Gn	Adult	1	Gn	Adult
13	Gn		10	Gn	

Conclusion: Juvenile turtles noted in some abundance scattered along the coastline. Two "adult" sized turtles observed. Additional surveys covering different hours, moon, tide phases and months are needed to confirm preliminary findings, determine variability, and establish peak times of abundance. Capture and tagging of turtles in this region might be possible by hand if experienced fishermen employed. Nighttime captures might be feasible given appropriate oceanic conditions.

Tahgong, Northeast Tinian

Date: 03/19/01

Type: Cliffline

Location: Tahgong, Northeast Tinian

Site Description:

Four stations spread along the cliffline. Low lying convoluted limestone shoreline two to three meters above sea level. Narrow intertidal bench extends up to five meters in some areas. Reef evident to 20 plus meters. Some boulders evident at reef edge. Benthic features beyond the reef edge could not be viewed. Map bathymetry suggests a steep drop-off just beyond the reef reaching 18 m depth, and 100 m depth approximately 180 m from shore. No stream entrances noted within the region. Swell 0.3 meters, winds light. Photos available.

Access:

A paved road leads north towards Puntan Tahgong. A right turn off onto a wide, well trimmed grass road leads to Cross Point at the northern tip of the island. A gravel and grassy road extends to the southeast along the coastline, and widens at the selected site. Travel time by car from San Jose estimated at 40 minutes. A three minute hike across limestone is necessary to reach the low lying nearshore cliffs. Travel time by boat (31 ft. DPS Fountain) approximately 50 minutes.

Description of Methodology:

Cliffline observers sketched the shoreline and submerged benthic features within their range of visibility. When a turtle was sighted on the surface or swimming subsurface, the time was noted and binoculars were used to identify species and estimate size. Features such as tail length and any identifying marks were recorded when observed. The estimated surface time and behavior of each turtle was noted when possible, and the location and/or route of each turtle was plotted on the area map sketch and numbered. The location of each observer was measured using a Garmin handheld GPS unit. Environmental conditions and location factors deemed relevant were recorded.

Personnel:

Larry Ilo, John Manglona, Frank Rasa, Steve Kolinski

Source of Information:

Turtles are noted by fishermen and Conservation Officers to be well distributed along the northeast and east coasts of Tinian.

Location:

Tahgong (1)

John Manglona

Time	Obs. No.	Species	Size	Notes	Tide:	Lat.	Long.	(+/- 8.2 m)
17:15				START	High falling, 2 days past half moon (neap) towards new.	15°05.794	145°03.960	
17:20	1	Gn	Juv	Approx. 60 cm surfaced 10 m from shore. Same turtle reappeared 3 minutes later.				
17:32	2	Gn	Juv	Approx. 70 cm surfaced 12 m from shore for 10 secs.				
17:37	3	Gn	Juv	Approx. 65 cm surfaced 15 m from shore for 1 min.				
17:47	4	Gn	Juv	Approx. 65 cm surfaced and swimming 5 m from shore for 2 min. May be turtle # 3.				
18:25				STOP				

Tot. Time

(hrs:mins)

1:10

Estimated Number of Turtles Observed

3

Gn

Juv

Transect Length (km)

0.110

Turtles per km

27.3

Location:	Tahgong (2)		Lat. 15°05.741	Long. 145°38.984	(+/- 5.2 m)
Observer:	Frank Rasa				
Time	Obs. No.	Species	Size	Notes	Tide: High falling, 2 days past half moon (neap) towards new.
17:09				START	
17:09	1	Gn	Juv	Approx. 50 - 60 cm. Surfaced for 20 secs.	
17:10	2	Gn	Juv	Approx. 45 - 50 cm surfaced for 15 secs.	
17:15	3	Gn	Juv	Approx. 40 - 50 cm surfaced 20 secs.	
17:18	4	Gn	Juv	Approx. 40 - 50 cm surfaced for 30 secs. May be turtle # 3.	
17:21	5	Gn	Juv	Approx. 35 - 45 cm surfaced for 20 secs.	
17:25	6	Gn	Juv	Approx. 40 - 50 cm surfaced 15 secs.	
17:26	7	Gn	Juv/Adult	Approx. 70 - 80 cm surfaced or 5 secs.	
17:28	8	Gn	Juv	Approx. 35 - 45 cm surfaced for 10 secs. May be turtle # 5.	
17:44	9	Gn	Juv	Approx. 40 - 50 cm surfaced 30 secs. May be turtle # 3.	
17:49	10	Gn	Juv	Approx. 35 - 45 cm surfaced for 10 secs.	
18:25				STOP	
Tot. Time					
(hrs:mins)	Obs.	Species	Size	Estimated Number of Turtles Observed	Transect Length (km)
1:16	9	Gn	Juv	6	0.110
	1	Gn	Juv/Adult	1	
	10	Gn		7	
					Turtles per km
					63.6
Location:	Tahgong (3)		Lat. 15°05.708	Long. 145°39.024	(+/- 4.3 m)
Observer:	Larry Ilo				
Time	Obs. No.	Species	Size	Notes	Tide: High falling, 2 days past half moon (neap) towards new.
17:19				START	
17:20	1	Gn	Juv	Juvenile turtle surfaced 20 m from shore for 15 secs.	
18:35				STOP	
Tot. Time					
(hrs:mins)	Obs.	Species	Size	Estimated Number of Turtles Observed	Transect Length (km)
1:16	1	Gn	Juv	1	0.110
					Turtles per km
					9.1
Location:	Tahgong (4)		Lat. 15°05.650	Long. 145°39.066	(+/- 3.4 m)
Observer:	Steve Kolinski				
Time	Obs. No.	Species	Size	Notes	Tide: High falling, 2 days past half moon (neap) towards new.
17:15				START	
17:39	1	Gn	Juv	Approx. 40 - 50 cm surfaced 6 m from shore for 10 secs.	
18:13	2	Gn	Juv	Juvenile turtle swimming subsurface 13 m from shore.	
18:16	3	Gn	Juv	Approx. 35 - 45 cm surfaced 8 m from shore. May be # 1.	
18:29	4	Gn	Juv	Approx. 35 - 40 cm surfaced 10 m from shore. May be turtle # 3.	
18:30				STOP	

Tahgong, Northeast Tinian

Tot. Time (hrs:mins) 1:15
 Obs. 4
 Species Gn
 Size Juv
 Estimated Number of Turtles Observed 2
 Gn Juv
 Transect Length (km) 0.110
 Turtles per km 18.2

Summary:
 Max. Time (hrs:mins) 1:16
 Tot. Obs. 18
 Species Gn
 Size Juv
 Total Estimated Number of Turtles Observed 12
 Gn Juv
 1 Juv/Adult
 13 Gn
 Tot. Transect Length (km) 0.440
 Turtles per km 29.5

Conclusion: Juvenile turtles noted in abundance scattered along the coastline, with some concentration at Tahgong (2). At least two very small (35 to 45 cm) turtles observed. Only one potential adult sized turtle observed. Additional surveys covering different hours, moon, tide phases and months are needed to confirm preliminary findings, determine variability, and establish peak times of abundance. Capture and tagging of turtles in this region might be possible by hand if experienced fishermen employed. Nighttime captures might be feasible given appropriate oceanic conditions.

Date: 03/16/01
 Type: Cliffline
 Location: Abas Point, Sabanetan Tahgong, East Tinian

Site Description:

Four stations spread along the cliffline. Low lying convoluted limestone shoreline four to five meters above sea level. Narrow intertidal bench extends up to 30 m in some areas with a gradually sloping reef/pavement beyond. Map bathymetry suggests depths exceeding 15 m roughly 250 m from shore and 37 m approximately 400 m from shore. No stream entrances noted within the region. Swell to one meter, winds light.

Access:

A paved road leads to the Blowhole exit. A 4WD vehicle is required to proceed along an extremely overgrown non-paved back road along the shoreline towards Abas. Travel time by car from San Jose estimated at 40 minutes. A five minute hike through brush and across limestone is necessary to reach the low lying nearshore cliffs. Travel time by boat (31 ft. DPS Fountain) estimated at approximately 60 minutes.

Description of Methodology:

Cliffline observers sketched the shoreline and submerged benthic features within their range of visibility. When a turtle was sighted on the surface or swimming subsurface, the time was noted and binoculars were used to identify species and estimate size. Features such as tail length and any identifying marks were recorded when observed. The estimated surface time and behavior of each turtle was noted when possible, and the location and/or route of each turtle was plotted on the area map sketch and numbered. The location of each observer was measured using a Garmin handheld GPS unit. Environmental conditions and location factors deemed relevant were recorded.

Personnel: Jesse Pangelinan, Don Reyes, Elvin Masga, Steve Kolinski

Source of Information: Turtles are noted by fishermen and Conservation Officers to be well distributed along the east coast of Tinian.

Location: Abas Point (1)
 Observer: Jesse Pangelinan

Lat. 15°04.917 Long. 145°39.434 (+/- 4.6 m)

Time
 13:54

Obs. No. Species Size Notes Tide: Medium falling, 1 day before half moon (neap) towards new.

1	Gn	Juv/Adult	Approx. 75 cm surfaced 50 m from shore.	START
2	Gn	Juv/Adult	Approx. 90 cm surfaced 67 m from shore.	
3	Gn	Juv	Approx. 55 cm surfaced 55 m from shore.	
4	Gn	Juv	Approx. 40 cm surfaced 70 m from shore.	
5	Gn	Juv	Approx. 55 cm surfaced 60 m from shore. May be turtle # 3.	

15:01

Tot. Time
 (hrs:mins)
 1:07

Obs.	Species	Size	Estimated Number of Turtles Observed			
			Juv	Gn	Juv	Gn
3	Gn	Juv		2		
2	Gn	Juv/Adult		2		
5	Gn			4		

Transect
 Length (km)
 0.11

Turtles
 per km
 36.4

Lat. 15°04.859 Long. 145°39.431 (+/- 4.0 m)

Abas Point (2)

Steve Kolinski

Location:	Observer:	Time	Obs. No.	Species	Size	Notes	Tide:	Lat.	Long.	Turtles per km
13:44						START	Medium falling, 1 day before half moon (neap) towards new.	15°04.859	145°39.431	72.7
13:49			1	Gn	Juv/Adult	Approx. 70 - 80 cm surfaced 70 m from shore over reef for 3 mins.				
13:54			2	Gn	Juv	Approx. 55 - 60 cm surfaced 100 m from shore for 20 secs.				
14:16			3	Gn	Juv	Approx. 45 - 50 cm surfaced 80 m from shore over apparent hardpan.				
14:16			4	Gn	Juv	Approx. 50 - 60 cm surfaced 80 m from shore over sand/hardpan. Up at same time as # 3.				
14:33			5	Gn	Juv/Adult	Approx. 80 - 90 cm surfaced 100 m from shore for few secs.				
14:38			6	Gn	?	Size unknown surfaced 100 m from shore. May be turtle # 5.				
14:38			7	Gn	Juv.	Approx. 60 cm surfaced 100 m from shore for 20 secs.				
14:38			8	Gn	Juv	Approx. 50 cm surfaced for 10 secs. May be turtle # 4.				
14:41			9	Gn	Juv	Very small surfaced 60 m from shore for 1 min. May be turtle # 3.				
14:49			10	Gn	Juv/Adult	Approx. 80 - 90 cm surfaced 80 m from shore for 30 secs.				
14:50			11	Gn	Juv	Swimming submerged 40 m from shore.				
14:59						STOP				
Tot. Time (hrs:mins)										
1:15										

Obs.	Species	Size	Estimated Number of Turtles Observed	Transect Length (km)	Turtles per km
7	Gn	Juv	5	0.110	72.7
3	Gn	Juv/Adult	3		
1	Gn	?			
11	Gn		8		

Abas Point (3)

Don Reyes

Lat. 15°04.817 Long. 145°39.426 (+/- 6.1 m)

Tide: Medium falling, 1 day before half moon (neap) towards new.

Location:

Observer:

Time

13:25

14:25

14:48

15:00

Tot. Time

(hrs:mins)

1:35

Abas Point (3)				Lat. 15°04.817	Long. 145°39.426	(+/- 6.1 m)
Don Reyes						
Obs. No.	Species	Size	Notes	Tide:	Medium falling, 1 day before half moon (neap) towards new.	
1	Gn	Juv	START			
			Approx. 60 cm surfaced 80 m from shore.			
2	Gn	Juv/Adult	Approx. 75 cm surfaced 90 m from shore.			
			STOP			
				Transect	Turtles	
Obs.	Species	Size	Estimated Number of Turtles Observed		Length (km)	per km
1	Gn	Juv	1	Gn	0.110	18.2
1	Gn	Juv/Adult	1	Gn		
			Juv/Adult			
2	Gn		2	Gn		

Location: Abas Point (4) **Lat.** 15°04.7' **Long.** 145°39.388' (+/- 4.0 m)

Observer: Elvin Masga

Time 13:20 **Tide:** Medium falling, 1 day before half moon (neap) towards new.

13:30 **Notes** START

14:00 **Obs. No.** 1 **Species** Gn **Size** ? **Notes** Surfaced 60 m from shore.

14:30 **Obs. No.** 2 **Species** Gn **Size** ? **Notes** Surfaced 25 m from shore for 10 secs.

14:50 **Obs. No.** 3 **Species** Gn **Size** ? **Notes** Surfaced 12 m from shore for 20 secs.

15:00 **Obs. No.** 4 **Species** Gn **Size** ? **Notes** Surfaced 22 m from shore for 30 secs.

Tot. Time 15:00 **STOP**

Obs.	Species	Size	Estimated Number of Turtles Observed	Turtle Length (km)	Turtles per km
4	Gn	?	4	0.110	36.4

Summary:

Tot. Obs.	Species	Size	Total Estimated Number of Turtles Observed	Turtle Length (km)	Turtles per km
11	Gn	Juv	8	0.440	40.9
6	Gn	Juv/Adult	6		
5	Gn	?	4		
22	Gn		18		

Conclusion:

Juvenile and juvenile/adult turtles noted in abundance scattered along the coastline, with some concentration at Abas Point (2). Additional surveys covering different hours, moon, tide phases and months are needed to confirm preliminary findings, determine variability, and establish peak times of abundance. Accessibility problems and general habitat conditions limit the potential for successful tagging efforts within this area. Capture and tagging of turtles might be possible by hand if experienced fishermen employed and work conducted off a large boat. Nighttime captures might be feasible given appropriate oceanic conditions.

Date: 03/17/01

Type: Cliffline

Location: Blowhole, Sabanetan Chiget, East Tinian

Site Description:

Low lying flattened limestone shoreline two to three meters above sea level. A narrow intertidal bench extends approximately 10 m, and is followed by a gradually sloping reef/pavement 30 to 40 m offshore. Map bathymetry suggests a nearshore six meter depth reaching 11 m roughly 300 m from shore and depths of 37 m 575 m from shore. No stream entrances noted within the region. Swell 1.2 to 1.5 m, winds brisk. Restricted unexploded ordnance boundary bordering the site.

Access:

A paved road leads north towards the blowhole. A right turn off onto a wide gravel road leads to a parking area about 100 meters from the site. A one minute hike across flattened limestone is necessary to reach the low lying nearshore cliffs. Travel time by car from San Jose estimated at 25 minutes. Travel time by boat (31 ft. DPS Fountain) estimated at 60 minutes from San Jose.

Description of Methodology:

Cliffline observer sketched the shoreline and submerged benthic features within the range of visibility. When a turtle was sighted on the surface or swimming subsurface, the time was noted and binoculars were used to identify species and estimate size. Features such as tail length and any identifying marks were recorded when observed. The estimated surface time and behavior of each turtle was noted when possible; and the location and/or route of each turtle was plotted on the area map sketch and numbered. The location of the observer was measured using a Garmin handheld GPS unit. Environmental conditions and location factors deemed relevant were recorded.

Source of Information:

Turtles are noted by fishermen and Conservation Officers to be well distributed along the east coast of Tinian.

Location: Blowhole

Observer: Steve Kolinski

Lat. 15°04.468 Long. 145°39.357 (+/- 4.3 m)

Tide: Medium falling, day of half moon (neap) towards new.

Notes

START

1 Juv Juvenile surfaced 20 m from shore for 10 to 15 secs.

2 Juv Approx. 50 cm surfaced 30 m from shore for 2 mins. May be turtle # 1.

3 Juv Approx. 50 cm surfaced 20 m from shore for 2 min.

4 Juv Approx. 50 - 60 cm surfaced 20 m from shore for 5 secs.

5 ? Unknown size 20 m from shore way down in ordnance area.

STOP

Tot. Time
(hrs:mins)
1:16

Obs.	Species	Size	Estimated Number of Turtles Observed				Transect Length (km)	Turtles per km
4	Gn	Juv	3	Gn	Juv		0.150	26.7
1	Gn	?	1	Gn	?			
5	Gn		4	Gn				

Conclusion:

Juvenile green turtles observed along the coastline. Additional surveys covering different hours, moon, tide phases and months are needed to confirm preliminary findings, determine variability, and establish peak times of abundance. Proximity to a zone of unexploded ordnance and general habitat conditions limit the potential for successful tagging efforts within this region.

Date: 03/16/01
Type: Cliffline
Location: Sabanetan Asiga, East Tinian

Site Description: Four stations spread along the cliffline. Low lying convoluted limestone shoreline eight to 11 m above sea level. Narrow intertidal bench extends up to 10 m in some areas. Gradual slope of presumed pavement with boulders and sand grooves to 75 m from shore followed by a steep drop off. Map bathymetry suggests depths approaching 10 m 75 m from shore, followed immediately by depths of 22 m. Swell one meter, winds brisk. No stream entrances observed within the area. Photos available. Green turtle nesting reported to the south at Unai Dangkolo (Wiles et al. 1989, Pultz et al. 1999) and to the north at Unai Chiget (Pultz et al. 1999). Algae samples collected from Unai Dangkolo by Jones et al. (1974) noted by Hirth (1997) as green turtle forage.

Access: A paved road can be taken north past Unai Dangkolo. A steep dirt side track (4WD required) leads towards the Asiga shoreline cliffs. A hike across limestone is necessary to reach the cliffs. Travel time by car from San Jose estimated at 35 minutes. Travel time by boat (31 ft. DPS Fountain) estimated at 60 plus minutes.

Description of Methodology: Cliffline observers sketched the shoreline and submerged benthic features within their range of visibility. When a turtle was sighted on the surface or swimming subsurface, the time was noted and binoculars were used to identify species and estimate size. Features such as tail length and any identifying marks were recorded when observed. The estimated surface time and behavior of each turtle was noted when possible, and the location and/or route of each turtle was plotted on the area map sketch and numbered. The location of each observer was measured using a Garmin handheld GPS unit. Environmental conditions and location factors deemed relevant were recorded.

Personnel: Jesse Pangelinan, Don Reyes, Elvin Masga, Steve Kolinski

Source of Information: Turtles are noted by fishermen and Conservation Officers to be well distributed along the east coast of Tinian. The Asiga region north of Unai Asiga was particularly noted as a turtle area by Gus Dusalua (DPS Fire Rescue, Fisherman) who fishes in the area. Turtle nesting noted north and south of site (Wiles et al. 1989, Pultz et al. 1999). Algae samples collected south of site (Jones et al. 1974) noted by Hirth (1997) as green turtle forage.

Location: Asiga (1)				Lat. 15°02.955	Long. 145°39.066	(+/- 6.1 m)
Observer: Jesse Pangelinan						
Time	Obs. No.	Species	Size	Notes	Tide: Medium falling, 1 day before half moon (neap) towards new.	
16:13				START		
16:54	1	Gn	Juv	Approx. 50 cm. Surfaced 20 m from shore.		
16:58	2	Gn	Juv/Adult	Approx. 90 cm. Surfaced 45 m from shore.		
17:03	3	Gn	Juv	Approx. 65 cm. Surfaced 15 m from shore.		
	4	Gn	Adult	Approx. 95 cm. Surfaced 80 m from shore. Sex unknown.		
	5	Gn	Juv	Approx. 45 cm. Surfaced 30 m from shore.		
	6	Gn	Juv/Adult	Approx. 80 cm. Surfaced 50 m from shore.		
	7	Gn	Juv/Adult	Approx. 90 cm. Surfaced 60 m from shore. May be turtle # 2.		
17:15				STOP		

Tot. Time (hrs:mins)	Obs.	Species	Size	Estimated Number of Turtles Observed				Transect Length (km)	Turtles per km
1:02	3	Gn	Juv	3	Gn	Juv		0.100	60.0
	3	Gn	Juv/Adult	2	Gn	Juv/Adult			
	1	Gn	Adult	1	Gn	Adult			
	7	Gn		6	Gn				

Location: Asiga (2)
Observer: Steve Kolinski
Obs. No. Species Size Notes Tide: Medium falling, 1 day before half moon (neap) towards new. Lat. 15°02.911 Long. 145°39.031 (+/- 4.9 m)

Time	Obs. No.	Species	Size	Notes	Tide
16:10				START	
17:05	1	Gn	Juv	Approx. 35 - 40 cm. Surfaced 12 m from shore for 18 secs.	
17:09	2	Gn	Juv	Approx. 35 - 40 cm. Surfaced 20 m from shore for 25 secs.	
17:24				STOP	

Tot. Time (hrs:mins)	Obs.	Species	Size	Estimated Number of Turtles Observed				Transect Length (km)	Turtles per km
1:14	2	Gn	Juv	2	Gn	Juv		0.100	20.0

Location: Asiga (3)
Observer: Don Reyes
Obs. No. Species Size Notes Tide: Medium falling, 1 day before half moon (neap) towards new. Lat. 15°02.870 Long. 145°38.994 (+/- 6.1 m)

Time	Obs. No.	Species	Size	Notes	Tide
15:45				START	
17:00				STOP	

Tot. Time (hrs:mins)	Obs.	Species	Size	Estimated Number of Turtles Observed				Transect Length (km)	Turtles per km
1:15	0			0				0.100	0.0

Location: Asiga (4)
Observer: Elvin Masga
Obs. No. Species Size Notes Tide: Medium falling, 1 day before half moon (neap) towards new. Lat. 15°02.859 Long. 145°38.986 (+/- 11.6 m)

Time	Obs. No.	Species	Size	Notes	Tide
15:59				START	
16:10	1	Gn	Adult	Large turtle surfaced 37 m from shore for 15 secs. Sex unknown.	
16:35	2	Gn	Adult	Large turtle surfaced 40 m from shore for 10 secs. May be turtle # 1.	
17:00	3	Gn	Juv	Approx. 50 cm. Surfaced 20 m from shore for 5 secs.	
17:14				STOP	

Tot. Time (hrs:mins)	Obs.	Species	Size	Estimated Number of Turtles Observed				Transect Length (km)	Turtles per km
1:15	1	Gn	Juv	1	Gn	Juv		0.100	20.0
	2	Gn	Adult	1	Gn	Adult			
	3	Gn		2	Gn				

Summary:

Max. Time (hrs:mins)	Tot. Obs.	Species	Size	Total Estimated Number of Turtles Observed		Tot. Transect Length (km)	Turtles per km
1:15	6	Gn	Juv	6	Gn	0.400	25.0
	3	Gn	Juv/Adult	2	Gn		
	3	Gn	Adult	2	Gn		
	12	Gn		10	Gn		

Conclusion:

Turtle abundance along this transect variable. Additional surveys covering different hours, moon, tide phases and months are needed to confirm preliminary findings, determine time related variability, and establish peak times of abundance. Capture and tagging of turtles might be possible by hand if experienced fishermen employed and work conducted off a large boat. Nighttime captures might be feasible given appropriate oceanic conditions. At least two very small turtles (35 to 40 cm) observed. Recommend surveys north towards Puntan Asiga and Puntan Chiget take place.

North Masalok, East Tinian

Date: 03/19/01
Type: Cliffline
Location: North Masalok, East Tinian

Site Description: Five stations spread along the cliffline. Convoluted limestone shoreline four to six meters above sea level. Narrow intertidal bench extends up to 20 m in some areas. Presumed limestone pavement interspersed with boulders and sand filled grooves slopes gradually away from shore. Map bathymetry suggests depths less than or equal to 10 m up to 300 m from shore, followed by a steeper drop-off reaching depths of 37 m roughly 600 m offshore. No stream entrances noted within the region. Unai Dangkolo to the north and Unai Masalok to the south are known to host nesting green turtles (Wiles et al. 1989, Pultz et al. 1999). Algae from Unai Dangkolo collected by Jones et al. (1974) listed by Hirth (1997) as green turtle forage. Additional algae samples collected from Unai Dangkolo and Unai Masalok this survey. Swell one meter, winds variable.

Access: A paved road leads to the Unai Dangkolo turnoff. A fairly smooth dirt and grass back road to the right leads to the turnoff for North Masalok. A five minute hike along a narrow path is necessary to reach the shoreline cliffs. Travel time by car from San Jose estimated at 30 minutes. Travel time by boat (31 ft. DPS Fountain) estimated at approximately 60 plus minutes.

Description of Methodology: Cliffline observers sketched the shoreline and submerged benthic features within their range of visibility. When a turtle was sighted on the surface or swimming subsurface, the time was noted and binoculars were used to identify species and estimate size. Features such as tail length and any identifying marks were recorded when observed. The estimated surface time and behavior of each turtle was noted when possible, and the location and/or route of each turtle was plotted on the area map sketch and numbered. The location of each observer was measured using a Garmin handheld GPS unit. Environmental conditions and location factors deemed relevant were recorded.

Personnel: Henry King, Alfonso Reyes, Don Reyes, Elvin Masga, Jesse Pangelinan, Steve Kolinski

Source of Information: Turtles are noted by fishermen and Conservation Officers to be well distributed along the east coast of Tinian. Green turtle nesting has been reported to the north and south (Wiles et al. 1989, Pultz et al. 1999). Algae samples collected by Jones et al. (1974) from sites to the north listed by Hirth (1997) as green turtle forage in other areas of the world.

North Masalok (1)					Lat. 15°01.591	Long. 145°39.189	(+/- 5.5 m)
Alfonso Reyes							
Observer:	Obs. No.	Species	Size	Notes	Tide: High falling, 2 days after half moon (neap) towards new.		
Time				START			
9:10				STOP			
10:25							
Tot. Time	Obs.	Species	Size	Estimated Number of Turtles Observed	Transect	Length (km)	Turtles
(hrs:mins)	0			0		0.125	per km
1:15							0.0

[illegible]

Time	Obs. No.	Species	Size	Notes	Turtles per km
10:21	5	Gn	Adult	Approx. 90 - 95 cm. Surfaced 50 m from shore. May be turtle # 2.	56.0
10:24	6	Gn	Juv	Approx. 40 cm. Surfaced 45 m from shore.	
10:36	7	Gn	Juv	Approx. 55 cm. Surfaced 30 m from shore. May be turtle # 3.	
10:40	8	Gn	Juv	Approx. 70 cm. Surfaced 35 m from shore.	
10:42	9	Gn	Juv	Approx. 70 cm. Surfaced 65 m from shore.	
10:45				STOP	
Tot. Time (hrs:mins)					
1:15	Obs.	Species	Size	Estimated Number of Turtles Observed	Transect Length (km)
	7	Gn	Juv	6 Gn Juv	0.125
	1	Gn	Juv/Adult	1 Gn Juv/Adult	
	1	Gn	Adult		
	9	Gn		7 Gn	

Summary:		Tot. Obs.	Species	Size	Total Estimated Number of Turtles Observed		Tot. Transect Length (km)	Turtles per km
Max. Time (hrs:mins)	1:15	12	Gn	Juv	11	Gn	0.625	19.2
		1	Gn	Juv/Adult	1	Gn		
		1	Gn	Adult		Juv/Adult		
		14	Gn		12	Gn		

Conclusion: Turtle abundance along this transect variable. Additional surveys covering different hours, moon, tide phases and months are needed to confirm preliminary findings, determine time related variability, and establish peak times of abundance. Accessibility problems and general habitat conditions limit the potential for successful tagging efforts of resident turtles within this region. Capture and tagging of turtles in this region might be possible by hand if experienced fishermen employed and work from a large boat. Nighttime captures might be feasible given appropriate oceanic conditions.

Date: 03/18/01
Type: Cliffline
Location: Unai Masalok, East Tinian

Site Description:

A number of small medium to coarse grained sand, gravel and rubble beaches are separated by three to five meter high limestone cliffs bordering approximately 325 m of shoreline. Shallow pavement extends 40 to 50 m offshore to a crest, and then slopes gradually. Map bathymetry suggests depths between 10 and 18 m 200 to 400 m offshore. Depths exceeding 37 m apparently occur 500 m offshore. No stream entrances noted within the region. Swell one meter, winds light. Turtle nesting occurs on beaches. Algae samples collected. Photo available.

Access:

A paved road leads to the Unai Dangkolo turnoff. A fairly smooth dirt and grass back road to the turnoff for Unai Masalok. Travel time by car from San Jose estimated at 35 minutes. A two minute hike down a well trodden path leads to the beach. Cliff access is most easily obtained by scaling from the ocean side. Travel time by boat (31 ft. DPS Fountain) estimated at approximately 60 plus minutes.

Description of Methodology:

Cliffline observer sketched the shoreline and submerged benthic features within the range of visibility. When a turtle was sighted on the surface or swimming subsurface, the time was noted and binoculars were used to identify species and estimate size. Features such as tail length and any identifying marks were recorded when observed. The estimated surface time and behavior of each turtle was noted when possible, and the location and/or route of each turtle was plotted on the area map sketch and numbered. The location of the observer was measured using a Garmin handheld GPS unit. Environmental conditions and location factors deemed relevant were recorded.

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Source of Information:

Turtles are noted by fishermen and Conservation Officers to be well distributed along the east coast of Tinian. Green turtle nesting at Unai Masalok reported by Wiles et al. (1989) and Pultz et al. (1999).

Location: Unai Masalok
Observer: Steve Kolinski

Lat. 15°01.203 Long. 145°39.360 (+/- 4.9 m)

Time	Obs. No.	Species	Size	Notes	Tide:
16:11				START	High falling, 1 day past half moon (neap) towards new.
16:11	1	Gn	Juv	Approx. 50 - 60 cm.	Surfaced 60 m from shore.
16:47	2	Gn	Juv	Approx. 45 - 50 cm.	Surfaced 110 m from shore.
17:26				STOP	

Tot. Time (hrs:mins)	Obs.	Species	Size	Estimated Number of Turtles Observed	Transect Length (km)	Turtles per km
1:15	2	Gn	Juv	2	0.160	12.5

Conclusion:

Green turtles evident within the region. Additional surveys covering different hours, moon, tide phases and months are needed to confirm preliminary findings, determine variability, and establish peak times of abundance. Accessibility problems and general habitat conditions limit the potential for successful tagging efforts of resident turtles within this region. Capture and tagging of turtles in this region might be possible by hand if experienced fishermen employed and work from a large boat. Nighttime captures might be feasible given appropriate oceanic conditions.

Date: 03/19/01

Type: Cliffline

Location: Pina, East Tinian

Site Description:

Six stations spread along the cliffline. Convoluted limestone cliffs 8 to 12 m above sea level. Narrow intertidal benches extend up to eight meters in some areas. Limited pavement/reef with boulders and sand grooves evident to 20 plus meters, followed by an apparent steep slope. Map bathymetry and personal observations suggest deep nearshore waters. Depths exceeding 37 m noted 350 m from shore. No stream entrances apparent within the region. Swell one meter, winds light. Photos available.

Access:

A paved road leads to the Unai Dangkolo turnoff. A fairly smooth dirt and grass back road to the right leads to the turnoff for Pina. The grass parking area is in a reforestation conservation district. An old overgrown rocky road towards the cliffline can be taken with 4WD. A 10 minute hike over convoluted limestone is necessary to reach the shoreline. Travel time by car from San Jose estimated at 25 to 30 minutes. Travel time by boat (31 ft. DPS Fountain) estimated at approximately 50 minutes. Access to other areas within Pina requires hiking north or south along cliffline.

Description of Methodology:

Cliffline observers sketched the shoreline and submerged benthic features within their range of visibility. When a turtle was sighted on the surface or swimming subsurface, the time was noted and binoculars were used to identify species and estimate size. Features such as tail length and any identifying marks were recorded when observed. The estimated surface time and behavior of each turtle was noted when possible, and the location and/or route of each turtle was plotted on the area map sketch and numbered. The location of each observer was measured using a Garmin handheld GPS unit. Environmental conditions and location factors deemed relevant were recorded.

Personnel:

Alfonso Reyes, Don Reyes, Elvin Masga, Jesse Pangelinan, Larry Ilo, John Manglona, Frank Rasa, Steve Kolinski

Source of Information:

Turtles are noted by fishermen and Conservation Officers to be well distributed along the east coast of Tinian.

Location:

Pina (1)

Observer: Jesse Pangelinan

Lat. 15°00.387 Long. 145°40.419 (+/- 12.5 m)

Time 15:05 Tide: High falling, 2 days past half moon (neap) towards new.

15:14 START

15:15 1 Gn Juv Mid-sized juvenile close to 10 plus m from shore.

15:16 2 Gn Juv Very small turtle 12 plus m from shore.

15:18 3 Gn Juv Small turtle 15 plus m from shore.

15:20 4 Gn Juv Small turtle 20 plus m from shore.

15:26 5 Juv/Adult Larger turtle approx. 75 cm.

15:32 6 Gn Juv Mid-sized juvenile.

15:33 7 Gn Juv Mid-sized juvenile. May be turtle # 6.

15:38 8 Gn Juv Very small turtle. May be turtle # 4.

15:38 9 Gn Adult Large turtle approx. 95 cm.

15:38 10 Gn Juv Mid-sized juvenile.

15:41 11 Gn Juv Very small turtle. May be turtle # 3.

Time	Obs. No.	Species	Size	Notes	Estimated Number of Turtles Observed	Turtles per km
15:45	12	Gn	Juv	Midsized turtle.	8	50.0
15:48	13	Gn	Juv	Very small turtle. May be turtle # 2.	Gn Juv	
15:57	14	Gn	Juv.	Small turtle.	1 Gn Juv/Adult	
16:00	15	Gn	Adult	Large turtle approx. 90 plus cm. May be turtle # 9.	1 Gn Adult	
16:02	16	Gn	Juv	Very small turtle. May be turtle # 4	10 Gn	50.0
16:10				STOP		
Tot. Time (hrs:mins)						
1:05						

Location: Pina (2) Lat. 15°00.284 Long. 145°40.417 (+/- 7.3 m)

Observer: Steve Kolinski

Time	Obs. No.	Species	Size	Notes	Tide	Transect Length (km)	Turtles per km
14:53				START		0.200	75.0
15:06	1	Gn	Juv	Approx. 35 - 40 cm. Surfaced over boulder 20 m from shore for 2 mins.			
15:12	2	Gn	Juv	Approx. 50 - 60 cm. Surfaced 15 m off point.			
15:12	3	Gn	Juv	Approx. 35 - 40 cm. Surfaced 20 m from shore.			
15:17	4	Gn	Juv	Approx. 40 - 50 cm. Surfaced 25 m offshore for 1 min.			
15:26	5	Gn	Juv	Approx. 50 - 60 cm. Surfaced 10 to 15 m from shore for 2 mins.			
15:31	6	Gn	Juv	Approx. 50 - 55 cm. Surfaced 28 m offshore.			
15:31	7	Gn	Juv	Approx. 35 - 45 cm. Surfaced 30 m from shore. May be turtle # 3.			
15:33	8	Gn	Juv	Approx. 35 - 45 cm. Surfaced 40 to 50 m from shore.			
15:39	9	Gn	Juv	Approx. 35 - 40 cm. Surfaced 20 m offshore. May be turtle # 1.			
15:43	10	Gn	Juv	Approx. 35 - 40 cm. Surfaced 15 to 20 m from shore. Swimming.			
15:50	11	Gn	Juv	Small turtle 15 m from shore.			
15:55	12	Gn	Juv	Approx. 35 to 40 cm. Surfaced 40 m from shore for 4 mins. May be turtle # 8.			
15:57	13	Gn	Juv	Approx. 35 to 45 cm. Surfaced 30 m from shore for 2 mins. May be turtle # 10.			
16:02	14	Gn	Juv	Approx. 35 to 40 cm. Surfaced 25 m from shore for 20 secs. May be turtle # 3.			
16:06	15	Gn	Juv	Approx. 50 - 60 cm. Surfaced 20 to 30 m from shore. May be turtle # 6.			
16:08				STOP			
Tot. Time (hrs:mins)							
1:15							

Location: Pina (3) Lat. 15°00.207 Long. 145°40.384 (+/- 4.3 m)

Observer: Frank Rasa
Time 14:39
Obs. No. 1 Species Gn Size Juv Notes START Tide: High falling, 2 days past half moon (neap) towards new.

14:39	1	Gn	Juv	Small turtle surfaced for 15 secs.
14:46	2	Gn	Juv	Surfaced for 25 secs.
14:50	3	Gn	Juv	Small turtle surfaced for 20 secs.
14:54	4	Gn	Juv	Small turtle surfaced for 30 secs. May be turtle # 3.
14:54	5	Gn	Juv	Surfaced for 35 secs.
15:10	6	Gn	Juv	Small turtle surfaced for 10 secs. May be turtle # 1.
15:12	7	Gn	Juv/Adult	Surfaced for 30 secs.
15:13	8	Gn	Juv	Surfaced for 40 secs.
15:14	9	Gn	Juv	Very small turtle surfaced for 15 secs.
15:15	10	Gn	Juv	Very small turtle surfaced for 40 secs.
15:27	11	Gn	Juv	Small turtle surfaced for 50 secs.
15:39	12	Gn	Juv	Small turtle surfaced for 25 secs. May be turtle # 11.
15:41	13	Gn	Juv	Surfaced for 1 min. May be turtle # 8.
15:46	14	Gn	Juv	Surfaced for 1 min. May be turtle # 8.
15:50				STOP

Tot. Time
(hrs:mins)
1:11

Turtles
per km
75.0

Transect
Length (km)
0.120

Obs.	Species	Size	Estimated Number of Turtles Observed
13	Gn	Juv	8
1	Gn	Juv/Adult	1
14	Gn		9

Location: Pina (4) Lat. 15°00.131 Long. 145°40.366 (+/- 4.0 m)

Observer: Larry Ilo and John Manglona
Time 14:15
Obs. No. 1 Species Gn Size Juv Notes START Tide: High falling, Neap

14:19	1	Gn	Juv	Approx. 50 cm. Surfaced 15 m from shore.
14:53	2	Gn	Juv	Approx. 50 cm. Surfaced at same time as turtle # 1.
14:53	3	Gn	Juv	May be turtle # 1.
15:11	4	Gn	Juv	May be turtle # 1 or 2.
15:18	5	Gn	Juv	May be turtle # 1 or 2.
15:25	6	Gn	Juv	May be turtle # 1 or 2.
15:25	7	Gn	Juv	May be turtle # 1 or 2.
15:35	8	Gn	Juv	May be turtle # 1 or 2.
15:46				STOP

Tot. Time
(hrs:mins)
1:31

Turtles
per km
14.3

Transect
Length (km)
0.140

Obs.	Species	Size	Estimated Number of Turtles Observed
8	Gn	Juv	2
			Gn
			Juv

Location: Pina (5)				Lat. 15°00.103		Long. 145°40.357		(+/- 4.9 m)	
Observer: Alfonso Reyes				Obs. No.		Species		Size	
Time				Notes		Tide: High falling, 2 days past half moon (neap) towards new.		Estimated Number of Turtles Observed	
14:30				START				0	
15:50				STOP				0.120	
Tot. Time				Obs.		Species		Size	
(hrs:mins)				0					
1:20								0.0	
Turtles per km									
								0.0	
Transect Length (km)								0.120	

South Pina, East Tinian

Date: 03/21/01
Type: Cliffline
Location: South Pina, East Tinian

Site Description: Six stations spread along the cliffline. Large and numerous inlets and points. Convoluted limestone cliffs 20 to 30 m above sea level. Narrow intertidal benches extend up to 25 m in some areas. Eroded caverns common at base of cliffs. Limited pavement/reef with boulders and sand grooves evident to 30 plus meters. Map bathymetry and personal observations suggest deep nearshore waters. Depths exceeding 37 m noted 450 m from shore. No stream entrances apparent within the region. Swell one to two meters, winds light. Photo available.

Access: Land access to south Pina (including regions north and south) is difficult. Travel time by car estimated at 25 minutes. Vehicles must be parked along the side of a slim dirt back road. A 40 to 50 minute hike through forest, underbrush and over limestone over infrequently used hunting trails is required (machetes necessary). Travel along the clifflines either north or south is over convoluted limestone. Estimated travel time by boat (31 ft. DPS Fountain) approximately 45 minutes.

Description of Methodology: Cliffline observers sketched the shoreline and submerged benthic features within their range of visibility. When a turtle was sighted on the surface or swimming subsurface, the time was noted and binoculars were used to identify species and estimate size. Features such as tail length and any identifying marks were recorded when observed. The estimated surface time and behavior of each turtle was noted when possible, and the location and/or route of each turtle was plotted on the area map sketch and numbered. The location of each observer was measured using a Garmin handheld GPS unit. Environmental conditions and location factors deemed relevant were recorded.

Personnel: Henry King, Alfonso Reyes, Don Reyes, Elvin Masga, Jesse Pangelinan, Ray Dela Cruz, Larry Ilo, John Manglona, Frank Rasa, Steve Kolinski

Source of Information: Turtles are noted by fishermen and Conservation Officers to be well distributed along the east coast of Tinian.

South Pina (1)				Lat. 14°58.662	Long. 145°39.862	(+/- 4.6 m)
Observer:	Obs. No.	Species	Size	Notes	Tide:	Medium falling, 4 days before new moon (spring).
Time				START		
10:35						
10:37	1	Gn	Juv/Adult	Surfaced 90 m from shore for 2 mins.		
10:37	2	Gn	Juv/Adult	Surfaced 90 m from shore for 2 mins.		
10:40	3	Gn	Juv/Adult	Surfaced 100 m from shore for 2 mins.		
10:59	4	Gn	Adult	Large turtle sex unknown surfaced 100 m from shore for 4 mins.		
11:06	5	Gn	Juv	Small turtle 90 m from shore, swimming, surfaced for 3 mins..		
11:15	6	Gn	Adult	Large turtle sex unknown surfaced 90 m from shore swimming northeast. May be turtle # 4.		
11:32	7	Gn	Juv	Small turtle 100 m from shore swimming on surface for 4 mins.		
11:55				STOP		

Tot. Time
(hrs:mins)

1:20

Turtles
per km
24.0Transect
Length (km)
0.250

Estimated Number of Turtles Observed

Obs.	Species	Size
2	Gn	Juv
3	Gn	Juv/Adult
2	Gn	Adult
7	Gn	

2	Gn	Juv
3	Gn	Juv/Adult
1	Gn	Adult
6	Gn	

Location:

South Pina (2)

Observer: Henry King, Ray Dela Cruz

Time

10:45

Obs. No. Species Size

10:45

10:45

10:45

10:45

10:45

10:55

11:00

11:18

11:28

11:53

12:00

Lat.

Long.

Notes Tide: Medium falling, 4 days before new moon (spring).

START

Very small turtle. Surfaced approx. 60 m from shore for 16 mins.

Surfaced approx. 60 m from shore for 1hour 5 mins in debris.

Surfaced approx. 60 m from shore.

Surfaced approx. 60 m from shore for 1hour 5 mins in debris.

Surfaced approx. 100 m from shore.

Surfaced approx. 50 m from shore.

Surfaced for 1 min.

Surfaced for 12 mins.

Very small turtle surfaced 50 m from shore. May be turtle # 1.

STOP

Tot. Time
(hrs:mins)

1:15

Turtles
per km
40.0Transect
Length (km)
0.200

Estimated Number of Turtles Observed

Obs.	Species	Size
9	Gn	Juv

8	Gn	Juv
---	----	-----

Location:

South Pina (3)

Observer: Frank Rasa

Time

11:08

Obs. No. Species Size

11:50

11:51

12:00

12:12

12:15

12:20

Lat. 14°58.457 Long. 145°39.898 (+/- 4.6 m)

Notes Tide: Medium falling, 4 days before new moon (spring).

START

Very small turtle surfaced for 10 secs.

Surfaced for 1.25 mins.

Surfaced for 25 secs.

Large turtle sex unknown surfaced for 15 secs.

Surfaced for 2 mins. May be turtle # 2.

STOP

Tot. Time
(hrs:mins)

1:12

Turtles
per km
40.0Transect
Length (km)
0.100

Estimated Number of Turtles Observed

Obs.	Species	Size
1	Gn	Juv
3	Gn	Juv/Adult
1	Gn	Adult
5	Gn	

1	Gn	Juv
2	Gn	Juv/Adult
1	Gn	Adult
4	Gn	

South Pina, East Tinian

Lat. 14°58.379 Long. 145°39.931 (+/- 9.1 m)

South Pina (4)

Jesse Pangelinan

Notes: Medium falling, 4 days before new moon (spring).

START

Size

Obs. No. Species

Time

10:55	1	Gn	Adult	Large turtle sex unknown.	
11:00	2	Gn	Adult	Large turtle sex unknown.	
11:18	3	Gn	Juv/Adult		
11:20	4	Gn	Juv/Adult		
11:22	5	Gn	Juv		
11:25	6	Gn	Juv		
11:25	7	Gn	Juv		
11:29	8	Gn	Adult	Large turtle sex unknown.	
11:30	9	Gn	Juv	Surfaced approx. 50 m from shore.	
11:33	10	Gn	Juv		
11:34	11	Gn	Adult	Large turtle surfaced approx. 50 m from shore. May be turtle # 8.	
11:35	12	Gn	Adult	Large turtle surfaced with turtle # 11.	
11:36	13	Gn	Juv		
11:39	14	Gn	Juv		
11:40	15	Gn	Juv		
11:42	16	Gn	Adult	Surfaced approx. 60 m from shore. May be turtle # 9.	
11:44	17	Gn	Juv	Large turtle sex unknown. May be turtle # 1.	
11:45	18	Gn	Juv	May be turtle # 6.	
11:49	19	Gn	Juv/Adult	May be turtle # 13.	
11:50	20	Gn	Juv/Adult		
11:52	21	Gn	Juv	May be turtle # 19.	
12:00	22	Gn	Juv/Adult	May be turtle # 10.	
12:05	23	Gn	Adult	Large turtle sex unknown. May be turtle # 8.	
12:05	24	Gn	Juv		
12:15	STOP				

Tot. Time (hrs:mins)

Estimated Number of Turtles Observed

8 Gn Juv

Transect Length (km)

Turtles per km

0.220

68.2

South Pina (5)

Larry Ilo, John Manglona

Lat. 14°58.283 Long. 145°39.939 (+/- 4.5 m)

Notes: Medium falling, 4 days before new moon (spring).

START

Obs. No. Species

Time

11:22	5	Gn	Juv/Adult		
	7	Gn	Adult		
	24	Gn		15 Gn	

Time	Obs. No.	Species	Size	Notes	Estimated Number of Turtles Observed	Turtle Length (km)	Turtles per km
11:45	1	Gn	Juv/Adult	Surfaced for 2 mins.	3	0.250	16.0
11:45	2	Gn	Juv	Surfaced for 2 mins.	1		
12:01	3	Gn	Juv	Very small turtle surfaced for 4 mins.	Gn		
12:10	4	Gn	Juv	Very small turtle surfaced for 2 mins.	Juv		
12:15	5	Gn	Juv	Surfaced for 1 min. May be turtle # 2.	Juv/Adult		
12:30	6	Gn	Juv	May be turtle # 3.			
12:37	7	Gn	Juv	Surfaced for 12 secs. May be turtle # 2.			
12:40				STOP	4		
Tot. Time (hrs:mins)							
1:18							

Location: South Pina (6) **Lat.** 14°58.139 **Long.** 145°39.839 **(+/- 5.2 m)**

Observer: Steve Kolinski **Tide:** Medium falling, 4 days before new moon (spring).

Time	Obs. No.	Species	Size	Notes	Estimated Number of Turtles Observed	Turtle Length (km)	Turtles per km
11:36				START			
11:38	1	Gn	Juv/Adult	Larger turtle surfaced 40 to 50 m from shore for 2 mins.	3		
11:47	2	Gn	Juv/Adult	Larger turtle surfaced 60 to 70 m from shore.	1		
12:03	3	Gn	Juv/Adult	Dark shaded shell. Surfaced 60 m from shore.	Gn		
12:05	4	Gn	Juv/Adult	Surfaced 60 m from shore for 5 mins. May be turtle # 3.	Juv		
12:12	5	Gn	Adult	Sex unknown. Surfaced 50 m from shore.	Juv/Adult		
12:13	6	Gn	Juv/Adult	Surfaced 50 m from shore.			
12:14	7	Gn	Juv	Reddish coloration to shell. Surfaced 30 m from shore.			
12:18	8	Gn	Adult	Surfaced 60 to 70 m from shore for 3 mins. Sex unknown.			
12:28	9	Gn	Juv	Surfaced 40 to 50 m from shore. May be turtle # 6.			
12:31	10	Gn	Juv	Surfaced 40 m from shore.			
12:34	11	Gn	Juv	Surfaced 40 m from shore for 8 mins. Up same time as turtle # 10.			
12:36	12	Gn	Juv/Adult	Large turtle surfaced 70 to 80 m from shore. Up same time as turtle # 11. May be turtle # 1.			
12:51				STOP	9		
Tot. Time (hrs:mins)							
1:15							

South Pina, East Tinian

Summary:

Max. Time (hrs:mins)	Tot. Obs.	Species	Size	Total Estimated Number of Turtles Observed			Tot. Transect Length (km)	Turtles per km
1:20	34	Gn	Juv	25	Gn	Juv	1,320	34.8
	18	Gn	Juv/Adult	14	Gn	Juv/Adult		
	12	Gn	Adult	7				
	64	Gn		46	Gn			

Conclusion:

Green turtles of various sizes noted in abundance scattered along the coastline. Additional surveys covering different hours, moon, tide phases and months are needed to confirm preliminary findings, determine variability, and establish peak times of abundance. Locations further north and south recommended to be surveyed. Capture and tagging of turtles in this region might be possible by hand if experienced fishermen employed working off a large boat. Nighttime captures might be feasible given appropriate oceanic conditions.

Date: 03/13/01
Type: Cliffline
Location: Suicide Cliff, East Tinian

Site Description:

Four stations spread along the cliffline. Limestone cliffs 30 to 60 m above sea level. Cliff tops fairly flat and grassy. Intertidal benches extend up to 15 m in some areas. Eroded caverns common at base of cliffs. Pavement/reef with boulders and sand grooves evident to 30 plus meters at site 1, but less extensive at more southern sites. Map bathymetry and personal observations suggest deep nearshore waters. Depths exceeding 37 m noted 250 to 650 m from shore. No stream entrances apparent within the region. Swell one to two meters, winds brisk. Photos available.

Access:

The road is paved south to Suicide Cliff. Parking is abundant near the historical monument. Travel time by car from San Jose estimated at 15 minutes. Shoreline south of the marker is accessible by foot. Land access to shoreline north of the marker is limited by steep cliffs and brush. Travel time by boat (31 ft. DPS Fountain) estimated at approximately 35 minutes.

Description of Methodology:

Cliffline observers sketched the shoreline and submerged benthic features within their range of visibility. When a turtle was sighted on the surface or swimming subsurface, the time was noted and binoculars were used to identify species and estimate size. Features such as tail length and any identifying marks were recorded when observed. The estimated surface time and behavior of each turtle was noted when possible, and the location and/or route of each turtle was plotted on the area map sketch and numbered. The location of each observer was measured using a Garmin handheld GPS unit. Environmental conditions and location factors deemed relevant were recorded.

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Personnel:

Henry King, Alfonso Reyes, Don Reyes, Elvin Masga, Jesse Pangelinan, John Manglona, Steve Kolinski

Source of Information:

Turtles are noted by fishermen and Conservation Officers to be well distributed along the east coast of Tinian. The region north of Suicide Cliff was particularly noted as a turtle area by Gus Dusalua (DPS Fire Rescue, Fisherman) who fishes in the area. Gus estimated seeing 30 to 40 turtles in boulder habitat during daylight fishing expeditions. Land access to northern regions restricted by cliff and thick forest barriers.

Location:
Observer:

Suicide Cliff (1)
Alfonso Reyes, Steve Kolinski

Time	Obs. No.	Species	Size	Notes	Tide	Lat.	Long.
11:05				START	High falling, 3 days past full moon (spring).	14°56.377	145°39.101
11:15	1	Gn	Juv		Approx. 70 cm. Surfaced 50 m from shore, swimming towards reef area.		(+/- 4.3 m)
11:44	2	Gn	Juv		Surfaced over deep water roughly 100 m from shore.		
12:20				STOP			

Tot. Time
(hrs:mins)
1:15

Obs.	Species	Size	Estimated Number of Turtles Observed	Transect Length (km)	Turtles per km
2	Gn	Juv	2	0.300	6.7

Suicide Cliff, East Tinian

Location:		Suicide Cliff (2)				Lat. 14°56.319		Long. 145°39.136		(+/- ? m)	
Observer:		Don Reyes, Jesse Pangelinan									
Time	10:58	Obs. No.	Species	Size	Notes	Tide:	High falling, 3 days past full moon (spring).				
	12:15										
	12:23										
Tot. Time											
(hrs:mins)											
1:25											

Tot. Time
 (hrs:mins)
 1:15

Obs.	Species	Size		Estimated Number of Turtles Observed		
		Juv	Adult	Gn	Juv	Adult
3	Gn			2		
3	Gn			2		
6	Gn			4		

Transect
 Length (km)
 0.150

Turtles
 per km
 26.7

Summary:

Max. Time
 (hrs:mins)
 1:37

Tot. Obs.	Species	Size		Total Estimated Number of Turtles Observed		
		Juv	Adult	Gn	Juv	Adult
9	Gn			7		
2	Gn			1		
3	Gn			2		
14	Gn			10		

Tot. Transect
 Length (km)
 0.800

Turtles
 per km
 12.5

Conclusion:

Green turtles evident within the region. Additional surveys covering different hours, moon, tide phases and months are needed to confirm preliminary findings, determine variability, and establish peak times of abundance. Surveys north towards and beyond Puntan Kastyu highly recommended. Capture and tagging of turtles in this region might be possible by hand if experienced fishermen employed and work from a large boat. Nighttime captures might be feasible given appropriate oceanic conditions.

Date: 03/17/01

Type: Cliffline

Location: Puntan Carolinas, Eastern Survey Site (1), South Tinian

Site Description:

Limestone cliff 30 to 35 m above sea level. Cliff top fairly flat and grassy. Intertidal benches and boulders extend up to 25 m in some areas. Eroded caverns common at base of cliffs. Pavement/reef with boulders and sand grooves evident to 40 plus meters. Map bathymetry suggests depths approaching 10 meters 200 m offshore, followed by a steep drop. No stream entrances apparent within the region. Swell one to two meters, winds brisk. Photo available.

Access:

One can pull off onto the grass along the paved road to Suicide Cliff and easily hike across the flattened grassy limestone cliff top to the shoreline. Travel time by car from San Jose estimated at 15 minutes. Travel time by boat (31 ft. DPS Fountain) approximately 30 minutes.

Description of Methodology:

Cliffline observer sketched the shoreline and submerged benthic features within the range of visibility. When a turtle was sighted on the surface or swimming subsurface, the time was noted and binoculars were used to identify species and estimate size. Features such as tail length and any identifying marks were recorded when observed. The estimated surface time and behavior of each turtle was noted when possible, and the location and/or route of each turtle was plotted on the area map sketch and numbered. The location of the observer was measured using a Garmin handheld GPS unit. Environmental conditions and location factors deemed relevant were recorded.

Source of Information: No indications of turtle abundance were obtained for this region. The site was selected as a means of adequately sampling south Tinian.

Location: Puntan Carolinas (1)

Observer: Steve Kollinski

Lat. 14°56.036 Long. 145°38.946 (+/- 7.9 m)

Time	Obs. No.	Species	Size	Notes	Tide:
11:01				START	High rising, half moon (neap) towards new.
11:10	1	Gn	?	Surfaced for approx. 30 secs 50 to 60 m from shore above boulder habitat.	
11:10	2	Gn	Juv	Approx. 70 cm surfaced 50 to 60 m from shore above boulder habitat.	
11:14	3	Gn	Juv	Surfaced approx. 50 to 60 m from shore, swam in circles for 7 mins before descending. May be turtle # 2.	
11:49	4	Gn	Juv	Approx. 60 cm. Surface 30 m from shore over boulder habitat for 40 secs.	
11:57	5	Gn	Adult	Approx. 100 - 110 cm. Surfaced 80 to 90 m from shore. Can't make out tail.	
12:01	6	Gn	Adult	Approx. 90 plus cm. Surfaced 80 m from shore, swam towards shore for 2 mins.	
12:04	7	Gn	?	Surfaced 100 m plus from shore.	
12:19	8	Gn	Juv/Adult	Approx. 70 to 85 cm. Surface 70 to 80 m from shore for 1 min.	
12:25	9	Gn	Juv	Approx. 40 - 50 cm. Surfaced 25 m from shore in ocean backwash.	
12:26	10	Gn	Juv	Approx. 70 cm surfaced 60 m from shore. May be turtle # 8.	
12:26				STOP	

Tot. Time (hrs:mins)	Obs.	Species	Size	Estimated Number of Turtles Observed			Transect Length (km)	Turtles per km
				Juv	Gn	Juv		
1:25	5	Gn	Juv	3			0.220	31.8
	1	Gn	Juv/Adult	0	Gn	Juv/Adult		
	2	Gn	Adult	2	Gn	Adult		
	2	Gn	?	2	Gn	?		
	10	Gn		7	Gn			

Conclusion: Green turtles evident within the region. Additional surveys covering different hours, moon, tide phases and months are needed to confirm preliminary findings, determine variability, and establish peak times of abundance. Capture and tagging of turtles in this region might be possible by hand if experienced fishermen employed and work from a large boat. Nighttime captures might be feasible given appropriate oceanic conditions.

Date: 03/17/01
Type: Cliffline
Location: Puntan Carolinas, Eastern Survey Site (2), South Tinian

Site Description:

Limestone cliff 30 to 35 m above sea level. Cliff top fairly flat and grassy. Intertidal benches and boulders extend up to 15 m in some areas. Eroded caverns common at base of cliffs. Pavement/reef with boulders and sand grooves evident to 40 plus meters. Map bathymetry suggests depths approaching 10 meters 200 m offshore, followed by a steep drop. No stream entrances apparent within the region. Swell one to two meters, winds brisk. Photo available.

Access:

One can pull off onto the grass along the paved road to Suicide Cliff and easily hike across the flattened grassy limestone cliff top to the shoreline. Travel time by car from San Jose estimated at 15 minutes. Travel time by boat (31 ft. DPS Fountain) approximately 30 minutes.

Description of Methodology:

Cliffline observer sketched the shoreline and submerged benthic features within the range of visibility. When a turtle was sighted on the surface or swimming subsurface, the time was noted and binoculars were used to identify species and estimate size. Features such as tail length and any identifying marks were recorded when observed. The estimated surface time and behavior of each turtle was noted when possible, and the location and/or route of each turtle was plotted on the area map sketch and numbered. The location of the observer was measured using a Garmin handheld GPS unit. Environmental conditions and location factors deemed relevant were recorded.

57

Source of Information: No indications of turtle abundance were obtained for this region. The site was selected as a means of adequately sampling south Tinian.

Location: Observer:	Puntan Carolinas			Lat. 14°55.878		Long. 145°38.861		(+/- 6.7 m)
	Steve Kolinski							
	Time	Obs. No.	Species	Size	Notes	Tide	High falling, half moon (neap) towards new.	
	12:41	1	Gn	Juv	START			
	13:15				Approx. 50 - 60 cm. Surfaced 25 m from shore over boulder for 45 secs.			
13:59	STOP							
Tot. Time (hrs:mins)	Obs.	Species	Size	Estimated Number of Turtles Observed		Transect Length (km)		Turtles per km
1:18	1	Gn	Juv	1	Gn	Juv	0.220	4.5

Conclusion: Turtles were not found to be abundant at this site. Additional surveys covering different hours, moon, tide phases and months are needed to confirm preliminary findings, determine variability, and establish peak times of abundance. Tagging efforts at this site are not recommended at this time.

Date: 03/12/01
Type: Cliffline
Location: Puntan Carolinas, Eastern Survey Site (3), South Tinian

Site Description: Limestone cliff 30 to 35 m above sea level. Cliff top fairly flat and grassy. Intertidal benches and boulders extend up to 15 m in some areas. Eroded caverns common at base of cliffs. Pavement/reef with boulders and sand grooves evident to 40 plus meters. Map bathymetry suggests depths approaching 10 meters 200 m offshore, followed by a steep drop. No stream entrances apparent within the region. Swell one meter, winds light.

Access: A well traveled dirt road leads off the paved road to Suicide Cliff. A short hike across a flattened grassy limestone cliff top required. Travel time by car from San Jose estimated at 15 minutes. Travel time by boat (31 ft. DPS Fountain) approximately 30 minutes

Description of Methodology: Cliffline observers sketched the shoreline and submerged benthic features within their range of visibility. When a turtle was sighted on the surface or swimming subsurface, the time was noted and binoculars were used to identify species and estimate size. Features such as tail length and any identifying marks were recorded when observed. The estimated surface time and behavior of each turtle was noted when possible, and the location and/or route of each turtle was plotted on the area map sketch and numbered. The location of each observer was measured using a Garmin handheld GPS unit. Environmental conditions and location factors deemed relevant were recorded.

57 **Source of Information:** Three fishermen at the site noted they rarely see turtles here.

Location: Observer:	Puntan Carolinas			Lat. Long.	
	Obs. No.	Species	Size	Notes	Tide:
Time 17:10 17:10 18:00	1	Gn	Juv	START Surfaced 20 to 30 m from shore for 20 secs. STOP	Low rising, 2 days following full moon (spring).
Tot. Time (hrs:mins) 0:50	Obs. 1	Species Gn	Size Juv	Estimated Number of Turtles Observed 1	Transect Length (km) 0.220 Turtles per km 4.5

Conclusion: Turtles were not found to be abundant at this site. Additional surveys covering different hours, moon, tide phases and months are needed to confirm preliminary findings, determine variability, and establish peak times of abundance. Surveys further south recommended. Tagging efforts at this site are not recommended at this time.

Target Area, Puntan Carolinas, South Tinian

Date: 03/13/01
Type: Cliffline
Location: Target Area, Puntan Carolinas, South Tinian

Site Description:

Four stations spread along the cliffline. Convoluted limestone shoreline 20 to 35 m above sea level. Narrow intertidal benches along some of the coast, but most cliff-water interfaces undercut and cavernous. Pavement and infrequent boulder habitat with scattered corals and various types of algae (samples collected). Depths of 10 m up to 50 m from shore, followed by steeply sloping pavement to depths of 18 m roughly 150 m offshore and 37 m 300 m from shore. No stream entrances noted within the region. Swell to one meter, winds light. Very strong southerly current. Photos available.

Access:

A well traveled dirt road leads off the paved road to Suicide Cliff. A five minute hike down a well trodden path gives way to convoluted limestone cliffs. Travel time by car from San Jose estimated at 15 minutes. Travel time by boat (31 ft. DPS Fountain) approximately 10 to 15 minutes. The area is frequented by fishermen.

Description of Methodology:

Cliffline observers sketched the shoreline and submerged benthic features within their range of visibility. When a turtle was sighted on the surface or swimming subsurface, the time was noted and binoculars were used to identify species and estimate size. Features such as tail length and any identifying marks were recorded when observed. The estimated surface time and behavior of each turtle was noted when possible, and the location and/or route of each turtle was plotted on the area map sketch and numbered. The location of each observer was measured using a Garmin handheld GPS unit. Environmental conditions and location factors deemed relevant were recorded.



Personnel: Henry King, Alfonso Reyes, Don Reyes, Elvin Masga, Jesse Pangelinan, Larry Ilo, John Manglona, Frank Rasa, Steve Kolinski

Source of Information:

The target region of Puntan Carolinas was noted by Conservation Officers and fishermen for it's numerous turtles. Mr. Kim (fisherman) noted seeing five to seven turtles while fishing off the cliffs. Pultz et al. (1999) observed two juvenile green turtles during a dive survey in 1995.

Target Area (1)				Lat.	14°55'450	Long.	145°37.98	(+/- ? m)
Location:	Observer:	Time	Obs. No.	Species	Size	Notes	Tide:	High rising, 3 days past full moon (spring).
9:16	Alfonso Reyes, Steve Kolinski					START		
9:17		1	Gn	Juv	Approx. 70 cm.	Surfaced 120 m from shore for 1 min.		
9:20		2	Gn	Juv	Approx. 50 cm.	Surfaced for 1 min.		
9:22		3	Gn	Juv	Approx. 50 cm.	Surfaced 45 m from shore for 1 min.		
9:27		4	Gn	Juv	Approx. 50 - 55 cm.	Surfaced 30 m from shore.		
9:31		5	Gn	Juv.	Surfaced approx. 15 to 20 m from shore.			
9:34		6	Gn	Juv	Approx. 70 cm.	Surfaced for 2 mins.		
9:45		7	Gn	Juv	Approx. 70 cm.	Surfaced for 1 min. May be turtle # 6.		
9:47		8	Gn	Juv	Approx. 70 cm.	Surfaced 120 m from shore for 2 min. May be turtle # 1.		
9:50		9	Gn	Juv	Surfaced approx. 20 m from shore.	May be turtle # 5.		
10:00		10	Gn	Adult	Male turtle with long tail.	Approx. 100 cm.	Surfaced for 1 min over sandy area.	
10:08		11	Gn	Juv	Approx. 50 cm.	Surfaced approx 60 m from shore for 1 min.		

Time	Obs. No.	Species	Size	Notes
10:10	12	Gn	Juv	Approx. 70 cm. Surfaced 20 to 25 m from shore for 10 secs.
10:10	13	Gn	Juv	Approx. 55 cm. Surfaced 15 to 20 m from shore for 1 min. May be turtle # 4.
10:10	14	Gn	Juv	Approx. 50 cm. Surfaced 70 m from shore for 10 secs. May be turtle # 2.
10:10	15	Gn	Juv/Adult	Approx. 70 to 80 cm. Surfaced 70 to 80 m from shore for 2 mins.
10:19	16	Gn	Juv	Surfaced 50 to 60 m from shore.
10:22	17	Gn	Juv	Approx. 70 cm. Surfaced 90 m from shore over sandy area for 2 mins. High domed shell.
10:27	18	Gn	Juv	Approx. 50 cm. Surfaced 130 to 150 m from shore for 10 secs.
10:30	19	Gn	Juv	Approx. 50 cm. Surfaced 15 to 20 m from shore for 1 min. May be turtle # 4 or 5.
10:31	20	Gn	Juv	Approx. 60 - 70 cm. May be turtle # 6.
10:31				STOP
Tot. Time (hrs:mins)				
1:15				

Obs.	Species	Size	Estimated Number of Turtles Observed			Transect Length (km)	Turtles per km
18	Gn	Juv	11	Gn	Juv	0.150	86.7
1	Gn	Juv/Adult	1	Gn	Juv/Adult		
1	Gn	Adult	1	Gn	Adult		
20	Gn		13	Gn			

Location: Target Area (2) Lat. 14°55.495 Long. 145°37.93 (+/- 4.0 m)

Observer: Don Reyes, Jesse Pangelinan

Time	Obs. No.	Species	Size	Notes	Tide
8:25				START	High rising, 3 days past full moon (spring).
8:34	1	Gn	Juv	Surfaced 40 m from shore for 5 secs.	
8:35	2	Gn	Adult	Very large turtle, possibly female. Surfaced for 5 secs. White barnacles on carapace.	
8:38	3	Gn	Juv	Very small turtle surfaced for 3 secs.	
8:42	4	Gn	Juv	Surfaced 40 m from shore for 6 secs.	
8:44	5	Gn	Juv	Surfaced for 10 secs.	
8:47	6	Gn	Juv	Surfaced for 15 secs. May be turtle # 6.	
9:30	7	Gn	Adult	Apparent male surfaced 60 m distant for 2 secs.	
9:36	8	Gn	Adult	Apparent female surfaced 50 m from shore for 5 secs. May be turtle # 3.	
9:45				STOP	

Obs.	Species	Size	Estimated Number of Turtles Observed			Transect Length (km)	Turtles per km
5	Gn	Juv	4	Gn	Juv	0.140	42.9
3	Gn	Adult	2	Gn	Adult		
8	Gn		6	Gn			

Tot. Time (hrs:mins)
1:20

Target Area, Puntan Carolinas, South Tinian

Lat. 14°55.526 Long. 145°37.93 (+/- 7.9 m)

Target Area (3)

Henry King, John Manglona

Obs. No. Species Size Notes

8:25 1 Gn Juv/Adult START
8:30 2 Gn Juv Surfaced approx. 50 m from shore for 3 mins.
9:10 3 Gn Juv Surfaced approx. 70 m from shore for 3 mins.
9:22 4 Gn ? May be turtle # 2.
9:28 5 Gn Juv Surfaced 60 m from shore.
9:35 6 Gn Adult Small turtle. Visible damage on carapace.
9:38 Large male turtle with algae on carapace surfaced 75 m from shore for 2 mins.
9:40 STOP

Tot. Time
(hrs:mins)
1:15

Obs.	Species	Size	Estimated Number of Turtles Observed				Transect Length (km)	Turtles per km
3	Gn	Juv	2	Gn	Juv		0.120	41.7
1	Gn	Juv/Adult	1	Gn	Juv/Adult			
1	Gn	Adult	1		Adult			
1	Gn	?	1	Gn	?			
6	Gn		5	Gn				

Target Area (4)

Elvin Masga

Obs. No. Species Size Notes

8:30 1 Gn Adult Sex unknown. Surfaced for 4 secs.
8:30 2 Gn Juv Surfaced 4 secs.
8:31 3 Gn Juv Surfaced 15 secs.
8:32 4 Gn Adult Sex unknown. Surfaced for 10 secs.
8:32 5 Gn Juv Surfaced for 15 secs.
8:36 6 Gn Juv Surfaced for 3 secs.
8:40 7 Gn Adult Surfaced 20 secs. swimming. May be turtle # 1.
8:45 8 Gn Adult Sex unknown. Surfaced for 30 secs. May be turtle # 1.
8:55 9 Gn Juv Surfaced for 10 secs. May be turtle # 5.
8:59 10 Gn Adult May be turtle # 4.
9:01 11 Juv/Adult Surfaced for 3 secs.
9:05 12 Gn Juv Surfaced for 15 secs. May be turtle # 12.
9:05 13 Gn Juv Surfaced for 15 secs.
9:10 14 Juv/Adult Surfaced for 20 secs. May be turtle # 11.
9:10 15 Gn Juv Surfaced for 10 secs.
9:14 16 Gn Juv White barnacles on carapace and tail. Surfaced for 4 secs.
9:27 17 Juv/Adult Surfaced for 2 secs.
9:40 STOP

Lat. 14°55.558 Long. 145°37.91 (+/- 4.0 m)

Location:
Observer:
Time

Tot. Time
(hrs:mins)
1:10

Transect
Length (km)
0.110

Turtles
per km
100.0

Obs.	Species	Size	Estimated Number of Turtles Observed		
			Juv	Juv/Adult	Adult
9	Gn	Juv	7	Gn	Gn
3	Gn	Juv/Adult	2	Gn	Gn
5	Gn	Adult	2	Gn	Gn
17	Gn		11	Gn	Gn

Summary:
Max. Time
(hrs:mins)
1:20

Tot. Transect
Length (km)
0.520

Turtles
per km
67.3

Tot. Obs.	Species	Size	Total Estimated Number of Turtles Observed		
			Juv	Juv/Adult	Adult
35	Gn	Juv	24	Gn	Gn
5	Gn	Juv/Adult	4	Gn	Gn
10	Gn	Adult	6	Gn	Gn
1	Gn	?	1	Gn	?
51	Gn		35	Gn	Gn

Conclusion: Green turtles noted in abundance within this region. Additional surveys covering different hours, moon, tide phases and months are needed to confirm preliminary findings, determine variability, and establish peak times of abundance. Capture and tagging of turtles might be possible by hand if experienced fishermen employed working off a large boat. Nighttime captures might be feasible given appropriate oceanic conditions.

Date: 03/14/01

Type: Tow

Location: Target Area to 14°56.149, Puntan Carolinas, South Tinian

Site Description:

Convolutd limestone shoreline 20 to 35 m above sea level. Narrow intertidal benches along some of the coast, but most cliff-water interfaces undercut and cavernous. Pavement and infrequent boulder habitat with scattered corals and various types of algae (samples collected). Depths of 10 m up to 50 m from shore, followed by steeply sloping pavement to depths of 18 m roughly 150 m offshore and 37 m 300 m from shore. No stream entrances noted within the region. Swell to one meter, winds light. Very strong southerly current.

Access:

The area is easily accessible by boat with travel time from San Jose at 10 to 15 minutes (DPS 31 ft. Fountain). Land access appears difficult.

Description of Methodology:

Two people were towed in back of the DPS 31 ft. Fountain surveying environments 50 to 70 m offshore. When a turtle was sighted the boat was stopped and the species, size, activity, time, depth and habitat characteristics were relayed to a recorder on the boat. Latitude and longitude were noted at the location where each turtle was encountered using a GPS unit. In addition, boat observers searched the waters surface for turtle ascents.

Source of Information:

The west side of Puntan Carolinas was noted by conservation officers and fishermen for it's numerous turtles. Mr. Kim (fisherman) noted seeing five to seven turtles while fishing off the cliffs in the target area. Pultz et al. (1999) observed two juvenile green turtles during a dive survey in the region.

Observers:

Ray Aldan, Henry King, Jesse Pangelinan, Alfonso Reyes, John Manglona, Steve Kolinski

Location: Target Area to Puntan Carolinas Southwest Boundary

Tide: High rising, 3 days before half moon (neap) towards new.

Time	Lat.	Long.	Error	Obs.	(m)	No.	Species	Size	Activity	Depth (m)	Habitat	Notes
10:27	14°55.572	145°47.874	8.2									START
10:27	14°55.572	145°47.874	8.2	1	Gn	Juv/Adult	Resting	21	Under boulder	Size approx. 90 cm.		Algae collected from prominence.
10:30												
10:30	14°55.631	145°37.837	7.0	2	Gn	Juv	Swimming	15	Sand, boulder	Size approx. 55 cm.		
10:36	14°55.662	145°37.821		3	Gn	Juv	Swimming	8	Boulder	Size approx. 55 cm.		
10:43	14°55.856	145°37.822	6.1	4	Gn	Juv	Swimming	1	Sand	Size approx. 60 cm.		Seen on surface from boat.
10:44	14°55.856	145°37.822	6.1	5	Gn	Juv	Swimming	18	Sand	Size approx. 65 - 70 cm.		
10:44	14°55.856	145°37.822	6.1	6	Gn	Juv	Swimming	18	Hardpan	Size approx. 70 cm.		
10:50	14°55.928	145°37.777	7.0									Algae collected from benthos.
10:55	14°55.955	145°37.770	4.6	7	Gn	Juv	Swimming	18	Boulder	Size approx. 45 cm.		
10:58	14°55.955	145°37.770	4.6	8	Gn	Juv	Swimming	21	Hardpan	Size approx. 55 cm.		
11:02	14°56.008	145°37.751	5.5	9	Gn	Juv/Adult	Swimming	21	Hardpan	Size approx. 90 cm.		Tail not visible.
11:02	14°56.008	145°37.751	5.5	10	Gn	Juv	Swimming	21	Hardpan	Size approx. 65 - 70 cm.		
11:05	14°55.960	145°37.768	4.3	11	Gn	Juv	Swimming	24	Sand	Size approx. 45 cm.		

Time	Lat.	Long.	Error (m)	Obs. No.	Species	Size	Activity	Depth (m)	Habitat	Notes	Transect Length (km)	Turtles per km
11:10	14°55.942	145°37.765	5.5	12	Gn	Juv	Feeding	15	Hardpan	Size approx. 45 - 50 cm.	1.270	11.0
11:17	14°56.079	145°37.754	6.1	13	Gn	Juv	Resting	15	Boulder	Size approx. 65 cm.		
11:20	14°56.147	145°37.762	6.1	14	Gn	Juv	Swimming	20	Hardpan	Size approx. 70 cm.		
11:20	14°56.147	145°37.762	6.1									
Tot. Time (hrs:mins)												
0:53												
				Obs. Species	Size	Estimated Number of Turtles Observed						
				12	Gn	Juv	12	Gn	Juv			
				2	Gn	Juv/Adult	2	Gn	Juv/Adult			
				14	Gn		14	Gn				

Conclusion: Green turtles noted in abundance within this region. Additional surveys covering different hours, moon, tide phases and months are needed to confirm preliminary findings, determine variability, and establish peak times of abundance. Capture and tagging of turtles might be possible by hand if experienced fishermen employed working off a large boat. Nighttime captures might be feasible given appropriate oceanic conditions.

Southwest Boundary to Horseshoe Patch Reef, West Saipan

Date: 03/14/01
Tow

Location: N14°56.149 Puntan Carolinas to Horseshoe Patch Reef, West Tinian

Site Description: Limestone shoreline low lying at south end of transect giving way to sand beach deposits at Unai Tachungnya to the north. Pavement and infrequent boulder habitat with scattered corals and various types of algae at the south end of the transect. Sand benthos with infrequent rock and/or coral outcrops is dominant on the north end of the transect. Depths varied between five and 18 m. No turtles observed over sand substrates. No stream entrances noted within the region. Swell to one meter, winds light. Randall (1990) observed fairly complex reef structure in nearshore habitats of Tachungnya which were bypassed in this survey. Sonoda (1990) identified various species of algae from the Tachungnya and Horseshoe Patch Reef regions which have been listed by Hirth (1997) as green turtle forage in other areas of the world.

Access: The area is easily accessible by boat with travel time from San Jose at seven 10 minutes (DPS 31 ft. Fountain).

Description of Methodology: Two people were towed in back of the DPS 31 ft. Fountain surveying environments 50 to 300 m offshore. When a turtle was sighted the boat was stopped and the species, size, activity, time, depth and habitat characteristics were relayed to a recorder on the boat. Latitude and longitude were noted at the location where each turtle was encountered using a GPS unit. In addition, boat observers searched the waters surface for turtle ascents.

Source of Information: Conservation officers suggested that turtles are not very abundant along this transect. Potential green turtle forage noted in the area (Sonoda 1990, see Hirth 1997).

Observers: Ray Aldan, Henry King, Jesse Pangelinan, Alfonso Reyes, John Manglona, Steve Kolinski
Location: Puntan Carolinas to Horseshoe Patch Reef

Tide: High falling, 3 days before half moon (neap) towards new.

Time	Lat.	Long.	Error Obs.		No.	Species	Size	Activity	Depth (m)	Habitat	Notes
			(m)								
11:20	14°56.147	145°37.762	6.1								START
11:23	14°56.197	145°37.760	7.9	1	Gn	Juv	Swimming	15	Hardpan		Size approx. 55 cm.
11:25	14°56.200	145°37.760	8.8	2	Gn	Juv	Swimming	18	Hardpan		Size approx. 45 cm.
11:28	14°56.325	145°37.724						18	Hardpan		Numerous <i>Acanthaster planci</i> .
11:32	14°56.403	145°37.681	4.0	3	Gn	Juv	Swimming	18	Sand, hardpan		Size approx. 60 cm.
11:35	14°56.403	145°37.653	4.6								
11:50	14°56.796	145°37.609	6.1								
12:00	14°56.896	145°37.623	4.6								

Tot. Time (hrs:mins)
0:40

Obs.	Species	Size	Estimated Number of Turtles Observed		
			Gn	Juv	
3			3		

Transect	Length (km)	Turtles per km
1.413		2.1

STOP: End of tow transect at Horseshoe Patch Reef.

Conclusion: Turtles were not observed to be abundant along this transect. Additional surveys covering different hours, moon, tide phases and months are needed to confirm preliminary findings, determine variability, and establish peak times of abundance. Additional focus on nearshore areas at Tachungnya recommended. Tagging efforts not recommended for this region at this time.

Date: 03/14/01
 Type: Snorkel
 Location: Horseshoe Patch Reef, Tachungnya, West Tinian

Site Description:

The majority of shoreline within this area is medium to coarse grain sand beach with limited construction though fairly active tourist beach and water activity. The patch reef is approximately 400 m offshore of Unai Tachungnya, located south of the harbor. The reef is slightly elongated with its longest dimension in a northwest-southeast direction (Doan et al. 1960). Eldredge and Randall (1980) reported patch reef dimensions of 300 m by 180 m. Numerous species of live coral, algae and limestone rock make up the reef. The reef edge slopes at an approximate 50 degree angle to depths of 11m. No streams were noted to enter the region. Swell 0.2 m, winds light. Sonoda (1990) identified various species of algae from the Tachungnya and Horseshore Patch Reef regions which have been listed by Hirth (1997) as green turtle forage in other areas of the world. Algae samples collected this survey. Photo available.

Access:

The area is easily accessible by boat with travel time from San Jose at five to seven minutes (DPS 31 ft. Fountain). One could also swim out to the patch reef from Unai Tachungnya.

Description of Methodology:

A group of four snorkelers was dropped off at the patch reef edge to conduct a snorkeling transect. Swimmers spread out in a line perpendicular to the reef with observer distances at approximately 10 m, and surveyed the slopes of the reef noting turtle species, size, activity, time, depth and habitat characteristics. One person recorded observations on underwater writing paper. The start and end points of the transect were measured with a GPS unit.

Source of Information:

Conservation officers indicated limited turtle abundance around the patch reef, with higher abundance found within and outside the harbor walls. Pultz et al. (1999) reported green turtle nesting at Unai Tachungnya and Krammer Beach. Potential green turtle forage noted in the area (Sonoda 1990, see Hirth 1997).

Observers: Gus Dusalua, Don Reyes, Elvin Masga, Larry Ilo, Frank Rasa
 Tide: High rising, 3 days before half moon (neap) towards new.

Time	Lat.	Long.	Error	Obs.	No.	Species	Size	Activity	Depth (m)	Habitat	Notes
10:00	14°57.095	145°37.624	8.8		1	Gn	Juv	Swimming	8	Sand	START
10:04					2	Gn	Juv	Resting	8	Coral	East side of reef.
10:30					3	Gn	Juv	Swimming	8	Coral, sand	West side of reef.
10:45					4	Gn	Adult	Swimming	8	Rock, sand	Southeast side of reef.
10:50					5	Gn	Adult	Swimming	8	Coral, rock	Southeast side of reef. Large male turtle.
10:55											East side of reef. Large female turtle.
11:00	14°57.095	145°37.624	8.8								STOP: Algae samples collected along transect.
Tot. Time											
(hrs:mins)											
1:00											
				Obs. Species			Size	Estimated Number of Turtles Observed			Transect Turtles
				3	Gn	Juv		3	Gn	Juv	Length (km)
				2	Gn	Adult		2	Gn	Adult	1.138
				5	Gn			5	Gn		per km
											4.4

Conclusion: Turtles were not observed to be abundant along this transect. Additional surveys covering different hours, moon, tide phases and months are needed to confirm preliminary findings, determine variability, and establish peak times of abundance. Capture and tagging of turtles might be possible by hand if experienced fishermen employed working off a boat. Nighttime captures might be feasible given appropriate oceanic conditions.

Date: 03/14/01, 3/15/01 and 3/20/01
Type: Boat Observations
Location: Inside Tinian Harbor, San Jose, West Tinian

Site Description: Tinian Harbor was constructed upon a natural lagoon formed by a barrier reef on the southwest side of Tinian Island in San Jose (Jones et al. 1974). A corroded interlocking sheet steel breakwater is constructed along a natural barrier reef system and for the most part separates the inside from outside of Tinian Harbor. Two large breaks in the wall are located along the northwest sector, and are deep enough to easily allow for turtle movements between regions. The wall and reef are approximately 1.5 km in length, and curve towards land. The shoreline has been greatly modified by dredging and filling (Jones et al. 1974, Eldredge and Randall 1980). The harbor substrate is mainly sand, with some rock prominences supporting limited coral growth and various sorts of algae. Algae is also present on the sand substrate. Jones et al. (1974), Eldredge and Randall (1980) and Maragos (1985) all reported limited patches of seagrass. No seagrasses were observed in this survey along algae collection transects within the harbor. The harbor water was surprising clear. No streams observed to enter the region. Water calm.

Access: Paved roads lead directly to the harbor. Travel time by car from most hotels in San Jose estimated at five minutes.

Description of Methodology: Turtles observed while entering and exiting the harbor were recorded. When a turtle was sighted the boat was stopped and the species, size, activity, time, depth and habitat characteristics were recorded. Latitude and longitude were noted at the location where each turtle was encountered using a GPS unit (only one GPS unit was available).

Source of Information: Conservation Officers and fishermen noted turtles frequently encountered inside Tinian Harbor, particularly at night. Algae collected by Jones et al. (1974) from inner harbor regions noted as green turtle forage by Hirth (1997) in other regions of the world. Eldredge and Randall (1980) and Maragos (1985) noted unspecified patches of seagrass within the harbor. Jones et al. (1974) mentions *Halophila minor* within the harbor.

Date: 03/14/01
Type: Boat Observations
Observers: Ray Aldan, Gus Dusalua, Henry King, Alfonso Reyes, Don Reyes, Elvin Masga, Jesse Pangelinan, Larry Ilo, John Manglona, Frank Rasa, Steve
Location: Inside Tinian Harbor, San Jose, West Tinian

Time	Lat.	Long.	Error Obs.			No.	Species	Size	Activity	Depth (m)	Habitat	Notes																										
			(m)	(m)	(m)																																	
12:06	14°57.097	145°37.038	5.2	1	Gn	Juv	Juv	Juv	Swimming	6	Sand, algae	Harbor entrance. High tide falling (neap).																										
13:44	14°57.854	145°37.070	4.9	2	Gn	Juv	Juv	Juv	Swimming	8	Sand, algae	Algae collected. High tide falling (neap).																										
13:50	14°57.776	145°37.328	4.3	3	Gn	Juv	Juv	Juv	Surface	9	Sand, algae	High tide falling (neap).																										
<table> <tr> <th colspan="2">Obs.</th><th colspan="2">Species</th><th colspan="2">Size</th><th colspan="2">Estimated Number of Turtles Observed</th><th colspan="2">Turtles per km</th><th colspan="3">Transect Length (km)</th></tr> <tr> <td>3</td><td>Gn</td><td>Juv</td><td>Juv</td><td>2</td><td>Gn</td><td>Juv</td><td>0.925</td><td>2.2</td><td></td><td></td><td></td><td></td></tr> </table>													Obs.		Species		Size		Estimated Number of Turtles Observed		Turtles per km		Transect Length (km)			3	Gn	Juv	Juv	2	Gn	Juv	0.925	2.2				
Obs.		Species		Size		Estimated Number of Turtles Observed		Turtles per km		Transect Length (km)																												
3	Gn	Juv	Juv	2	Gn	Juv	0.925	2.2																														

Date: 03/15/01
Type: Boat Observations
Observers: Ray Aldan, Gus Dusalua, Henry King, Alfonso Reyes, Don Reyes, Elvin Masga, Jesse Pangelinan, Larry Ilo, John Manglona, Frank Rasa, Steve
Location: Inside Tinian Harbor, San Jose, West Tinian

Time	Lat.	Long.	Error	Obs.	No.	Species	Size	Activity	Depth (m)	Habitat	Notes	Transect	
												Length (km)	Turtles per km
9:24	14°59.357	145°35.853	32.9	1	Gn	Juv/Adult	Surface	9	Sand, algae	Inner harbor.	Tide high rising (neap).	0.925	1.1
					Obs.	Species	Size	Estimated	Number of Turtles Observed			Length (km)	Turtles per km
					1	Gn	Juv/Adult	1	Gn	Juv/Adult		0.925	1.1

Date: 03/20/01
Type: Boat Observations
Observers: Ray Aldan, Gus Dusalua, Henry King, Alfonso Reyes, Don Reyes, Elvin Masga, Jesse Pangelinan, Larry Ilo, John Manglona, Frank Rasa, Steve
Location: Inside Tinian Harbor, San Jose, West Tinian

Time	Lat.	Long.	Error	Obs.	No.	Species	Size	Activity	Depth (m)	Habitat	Notes	Transect	
												Length (km)	Turtles per km
9:25				1	Gn	Juv	Surface	9	Sand, algae	Inner harbor.	Tide medium falling (neap).	0.925	1.1
					Obs.	Species	Size	Estimated	Number of Turtles Observed			Length (km)	Turtles per km
					1	Gn	Juv	1	Gn	Juv		0.925	1.1

Conclusion: Numbers of turtles within the harbor during daylight hours appear minimal. However, fishermen suggest nighttime numbers may be high. Food resources are apparent within the harbor (Jones et al. 1974, per. obs.). It is suggested that tangle nets be employed during nighttime hours over the two wall breaches and harbor entrance to the boat ramp region in an effort to capture turtles for tagging.

Date: 03/14/01
Type: Tow
Location: Outside Tinian Harbor Wall, San Jose, West Tinian

Site Description:

A corroded interlocking sheet steel breakwater is constructed along a natural barrier reef system and for the most part separates the inside from outside of Tinian Harbor. Two large breaks in the wall are located along the northwest sector, and are deep enough to easily allow for turtle movements between regions. The reef runs in a northwest to southeast direction and has crest depths of one meter gradually sloping to 11 m over 150 m distance. Numerous species of live coral, algae and limestone rock make up the barrier reef system. The wall and reef are approximately 1.5 km in length, and curve towards land. The inner harbor and shoreline features are described elsewhere. Turtles have been surveyed previously in this region (Pultz et al. 1999). Algae noted as green turtle forage in other parts of the world have been collected (Jones et al. 1974). Algae samples collected this survey. Swell 0.2 m, winds light. No streams were noted to enter the region. Photo available.

Access: The area is easily accessible by boat with travel time from Tinian Harbor at two minutes (DPS 31 ft. Fountain). The outer harbor wall and reef beyond can easily be reached by swimming across the harbor (boat traffic typically minimal) through either of two large holes in the sheet steel breakwater.

Description of Methodology:

Two boats (31 ft. Fountain and a 14 ft. whaler) were used in this survey. Two people were towed in back of each boat, with the whaler surveying shallower environments maintaining distances from shore approximately 30 to 100 m, and the Fountain surveying deeper environments 30 to 50 m offshore of the whaler. When a turtle was sighted the boat was stopped and the species, size, activity, time, depth and habitat characteristics were relayed to a recorder on the boat. Latitude and longitude were noted at the location where each turtle was encountered using a GPS unit (only one GPS unit was available). In addition, boat observers searched the waters surface for turtle ascents. Communication of turtle sightings between boats ensured multiple reports of individual turtles did not occur.

Personnel: Ray Aldan, Gus Dusatua, Henry King, Alfonso Reyes, Don Reyes, Elvin Masga, Jesse Pangelinan, Larry Ilo, John Manglona, Frank Rasa, Steve

Source of Information:

Conservation officers, fishermen and boaters reported high numbers of turtles on the outer harbor wall, with occasional sightings within the harbor, especially at night. Pultz et al. (1999) recorded 11 juvenile and one adult green turtles during two dive surveys in 1995 along the outside harbor wall. Jones et al. (1974) reported algae noted by Hirth (1997) as green turtle forage from transects both inside and outside of the harbor.

Type: Tow

Observers: Ray Aldan, Henry King, Jesse Pangelinan, Alfonso Reyes, John Manglona, Steve Kolinski

Location: Outside Tinian Harbor Wall, Deep Transect

Tide: High falling, 3 days before half moon (neap) towards new.

Time	Error Obs.				Depth (m)	Activity	Habitat	Notes
	Lat.	Long.	(m)	No. Species				
13:55	14°57.623	145°37.354	3.4					START
14:03	14°57.576	145°37.254	4.0	1 Gn	Juv	Resting	Coral, sand	Size approx. 50 cm.
14:06	14°57.553	145°37.145	5.2	2 Gn	Juv	Swimming	Coral, sand	Size approx. 50 cm.
14:06	14°57.553	145°37.145	5.2	3 Gn	Adult	Swimming	Sand	Male turtle. Size approx. 90 cm.

Outside Tinian Harbor Wall, San Jose, West Tinian

Time	Lat.	Long.	Error	Obs.	No.	Species	Size	Activity	Depth	Habitat	Notes
14:09	14°57.570	145°37.037	4.0						20		Corner of harbor wall.
14:20	14°57.796	145°36.739	4.0						20		Corner of harbor wall.
14:24	14°58.014	145°36.641	3.4	4	Gn	Juv/Adult	Swimmin	g	24	Hardpan, spur and groove	Size approx. 90 cm.
14:33	14°58.337	145°36.653	4.3								STOP: End of tow transect outer Tinian Harbor region, Telesource Power Plant, old dump site.

Tot. Time
(hrs:mins)
0:38

Transect
Length (km)
2.475

Turtles
per km
1.6

Obs.		Species	Size	Estimated Number of Turtles Observed			
2	Gn	Juv	2	Gn	Juv		
1	Gn	Juv/Adult	1	Gn	Juv/Adult		
1	Gn	Adult	1	Gn	Adult		
4	Gn		4	Gn			

Type: Tow

Observers: Gus Dusallua, Don Reyes, Elvin Masga, Larry Ilo, Frank Rasa

Location: Outside Tinian Harbor Wall, Shallow Transect

Tide: High falling, 3 days before half moon (neap) towards new.

Time	Lat.	Long.	Error	Obs.	No.	Species	Size	Activity	Depth	Habitat	Notes
14:04	14°57.623	145°37.354	3.4						8		START
14:05	14°57.623	145°37.354	3.4	1	Gn	Juv	Resting		8	Rock, sand	Under rock.
14:06				2	Gn	Juv	Swimming		9	Rock, sand	
14:07				3	Gn	Adult	Swimming		8	Boulder, sand	Male turtle.
14:08				4	Gn	Juv/Adult	Swimming		9	Rock, sand	Larger turtle.
14:10				5	Gn	Juv/Adult	Swimming		11	Boulder, sand	Larger turtle.
14:10				6	Gn	Adult	Swimming		11	Boulder, sand	Large turtle, small tail.
14:10				7	Gn	Adult	Swimming		11	Boulder, sand	Large turtle, small tail.
14:12				8	Gn	Juv/Adult	Resting		9	Boulder, sand	Larger turtle.
14:14				9	Gn	Juv	Swimming		6	Rock	
14:15				10	Gn	Juv	Swimming		8	Rock	
14:16				11	Gn	Juv/Adult	Swimming		8	Coral, rock	Larger turtle.
14:17				12	Gn	Juv	Resting		8	Coral, pavement	
14:21				13	Gn	Juv/Adult	Swimming		8	Rock	Larger turtle.
14:21				14	Gn	Juv	Swimming		8	Rock	
14:24				15	Gn	Juv/Adult	Swimming		8	Coral	Larger turtle.
14:26				16	Gn	Adult	Swimming		8	Coral	Large turtle, small tail.
14:27				17	Gn	Juv	Resting		9	Rock, sand groove	

Time	Lat.	Long.	Error (m)	Obs. No.	Species	Size	Activity	Depth (m)	Habitat	Notes
14:28				18	Gn	Juv	Swimming	8	Coral	
14:29				19	Gn	Juv	Swimming	9	Coral, sand	
14:31				20	Gn	Juv	Swimming	12	Rock	
14:31				21	Gn	Juv	Resting	8	Pavement	
14:31				22	Gn	Juv	Swimming	10	Pavement	Large turtle, small tail.
14:31				23	Gn	Adult	Swimming	10	Pavement	Male turtle.
14:34				24	Gn	Adult	Mating	11	Pavement	Female turtle.
14:34				25	Gn	Adult	Mating	11	Pavement	
14:36				26	Gn	Juv	Swimming	9	Coral, pavement	
14:38				27	Gn	Juv	Swimming	8	Coral, pavement	
14:39				28	Gn	Juv	Swimming	8	Coral, pavement	
14:43				29	Gn	Juv	Swimming	6	Rock, sand, coral	
14:45				30	Gn	Juv	Swimming	6	Coral, pavement	
14:45	14°58.349	145°36.671	3.6							

STOP: End of tow transect outer Tinian Harbor region, Telesource Power Plant, old dump site.

Tot. Time
(hrs:mins)
0:41

Transect
Length (km)
2.475

Turtles
per km
12.1

Summary:
Max. Time
(hrs:mins)
0:41

Tot.	Obs.	Species	Size	Estimated Number of Turtles Observed
17	Gn	Juv	17	Gn
6	Gn	Juv/Adult	6	Gn
7	Gn	Adult	7	Gn
30	Gn		30	Gn

Tot. Transect
Length (km)
2.475

Turtles
per km
13.7

Conclusion: Green turtles noted in abundance within this region, especially along the shallow transect closer to the barrier reef. Additional surveys covering different hours, moon, tide phases and months are needed to confirm preliminary findings, determine variability, and establish peak times of abundance. Capture and tagging of turtles might be possible by hand if experienced fishermen employed working off a boat. Nighttime captures might be feasible given appropriate oceanic conditions. Tangle nets might be employed to capture turtles moving between breaks in the harbor wall.

Leprosarium and Barcinas (Peipeinigul Bay), West Tinian

Date:	03/14/01										
Type:	Tow										
Location:	Leprosarium and Barcinas (Peipeinigul Bay), West Tinian										
Site Description:	The shoreline from Tinian Harbor to Leprosarium is low lying convoluted limestone rock a few meters above sea level. Benches, reef and scattered boulders comprise the nearshore habitat. Reef composed mainly of limestone pavement with patches of living coral in various abundances (Eldredge and Randall 1980). The reef extends up to 150 m from shore (Eldredge and Randall 1980), and slopes to pavement depths of 11 m 200 m from shore and 18 m depth 450 m from shore. A small beach along the shore has been reported to host nesting green turtles (Pultz et al. 1999). Peipeinigul Bay is roughly 1.3 km by 500 m. Shoreline cliffs heights vary between five and 20 m (Jones et al. 1974). Boulders and benches fringe various areas of shoreline. A fringing reef extends up to 150 m from shore (Eldredge and Randall 1980), with pavement sloping to 11 m roughly 200 m from shore and 18 m approximately 300 to 500 m from shore. Living coral is abundant in various nearshore shallow waters. Sea caves are present (Jones et al. 1974, Gus Dusalua pers. comm.). Algae noted as green turtle forage in other parts of the world have been collected (Jones et al. 1974). Algae samples collected during this survey. A small beach, Unai Barcinas, reported to host nesting green turtles (Pultz et al. 1999). No streams observed to enter the region. Swell < 0.2 m, winds light.										
Access:	The area is easily accessible by boat with travel time from Tinian Harbor at 10 to 12 minutes (DPS 31 ft. Fountain). Various areas of both sites appear to be accessible by road, although such routes were not taken..										
Description of Methodology:	Two boats (31 ft. Fountain and a 14 ft. whaler) were used in this survey. Two people were towed in back of each boat, with the whaler surveying shallower environments maintaining distances from shore approximately 50 to 150 m, and the Fountain surveying deeper environments 30 to 50 m offshore of the whaler. When a turtle was sighted the boat was stopped and the species, size, activity, time, depth and habitat characteristics were relayed to a recorder on the boat. Latitude and longitude were noted at the location where each turtle was encountered using a GPS unit (only one GPS unit was available). In addition, boat observers searched the waters surface for turtle ascents. Communication of turtle sightings between boats ensured multiple reports of individual turtles did not occur.										
Personnel:	Ray Aldan, Gus Dusalua, Henry King, Alfonso Reyes, Don Reyes, Elvin Masga, Jesse Pangelinan, Larry Ilo, John Manglona, Frank Rasa, Steve Kolinski										
Source of Information:	Leprosarium and in particular the Barcinas region were well noted by Conservation Officers and fishermen as areas to find numerous turtles. Gus Dusalua (DPS Fire Rescue, Fisherman) noted a cave at Barcinas in which he typically sees four to five large turtles resting. Pultz et al. (1999) conducted dive surveys in both regions and noted a total of seven juveniles in three dives at Leprosarium and nine juveniles and two adults in the Barcinas region over the course of four dives. Turtle nesting at Unai Barcinas has also been reported (Wiles et al. 1989, Pultz et al. 1999). Various species of algae collected within the region by Jones et al. (1974) have been noted by Hirth (1997) as green turtle forage.										
Type:	Tow										
Observers:	Ray Aldan, Henry King, Jesse Pangelinan, Alfonso Reyes, John Manglona										
Location:	Leprosarium and Barcinas, Deep Transect										
Tide:	Medium falling, 3 days before half moon (neap) towards new.										
Time	Lat.	Long.	Error	Obs.	No.	Species	Size	Activity	Depth	Habitat	Notes
14:33	14°58.337	145°36.653			4.3				(m)		START: Telesource Power Plant.

Time	Lat.	Long.	Error (m)	Obs. No.	Species	Size	Activity	Depth (m)	Habitat	Notes
14:45				1	Gn	Juv	Swimming	8	Hardpan	Off old dump site.
14:55				2	Gn	Juv	Swimming	9	Hardpan	Off old dump site.
15:00				3	Gn	Juv	Swimming	12	Rock	
15:02				4	Gn	Juv	Swimming	14	Rock	
15:04				5	Gn	Adult	Swimming	12	Sand	Male turtle 95 - 100 cm.
15:05				6	Gn	Juv/Adult	Resting	12	Coral, Rock	Larger turtle.
15:20				7	Gn	Juv	Swimming	12	Sand	Leprosarium beach.
15:25				8	Gn	Juv	Resting	12	Rock	Leprosarium beach.
15:50				9	Gn	Juv	Resting	9	Sand, coral	Very small turtle. Barcinas beach
15:54				10	Gn	Juv	Swimming	12	Sand, coral	Very small turtle. Barcinas beach
15:55				11	Gn	Juv	Swimming	12	Coral	Barcinas beach
15:59				12	Gn	Juv	Swimming	18	Sand, coral	Very small turtle. Barcinas beach
16:02				13	Gn	Juv	Swimming	12	Coral, sand	Barcinas beach
16:02				14	Gn	Juv/Adult	Swimming	12	Sand, coral	Barcinas beach
16:04				15	Gn	Juv/Adult	Resting	9	Coral	Barcinas beach
16:05	14°59.369	145°35.853	3.4							STOP: End at Barcinas Point, north.
Tot. Time (hrs:mins)										
1:32										
				Obs.	Species	Size	Estimated Number of Turtles Observed			
				11	Gn	Juv	11	Gn	Juv	Transect Length (km) 3.025 Turtles per km 5.0
				3	Gn	Juv/Adult	3	Gn	Juv/Adult	
				1	Gn	Adult	1	Gn	Adult	
				15	Gn		15	Gn		

Type:

Tow

Gus Dusalua, Don Reyes, Elvin Masga, Larry Ilo, Frank Rasa, Steve Kolinski

Leprosarium and Barcinas, Shallow Transect

Medium falling, 3 days before half moon (neap) towards new.

Time	Lat.	Long.	Error (m)	Obs. No.	Species	Size	Activity	Depth (m)	Habitat	Notes
14:47	14°58.337	145°36.653	4.3							START: Telesource Power Plant. Large turtle with small tail: likely female.
14:53	14°58.349	145°36.671	3.7	1	Gn	Adult	Resting	8	Rock, sand, coral	
14:54	14°58.354	145°36.357	3.4	2	Gn	Juv	Swimming	8	Coral, pavement	
14:54	14°58.354	145°36.357	3.4	3	Gn	Juv	Resting	8	Coral, pavement	
14:56	14°58.381	145°36.665	4.3	4	Gn	Juv	Swimming	9	Coral, pavement	Very small turtle.
15:03	14°58.519	145°36.681	3.0	5	Gn	Adult	Swimming	8	Coral, sand, pavement	Large turtle with small tail: likely female.
15:05	14°58.557	145°36.688	4.0	6	Gn	Juv/Adult	Swimming	11	Rock	
15:06	14°58.565	145°36.679	3.7	7	Gn	Juv/Adult	Swimming	14	Pavement	
15:11	14°58.634	145°36.688	3.0	8	Gn	Juv/Adult	Swimming	7	Coral, pavement	

Time	Error			Obs.	Depth			Notes			
	Lat.	Long.	(m)		No.	Species	Size		Activity	(m)	Habitat
15:15	14°58.723	145°36.687	3.0	9	Gn	Juv/Adult	Swimming	7	Coral, rock		
15:16	14°58.723	145°36.687	3.0	10	Gn	Juv	Swimming	11	Sand	Very small turtle.	
15:20	14°58.879	145°36.647	3.0	11	Gn	Juv	Swimming	5	Coral, rock	Very small turtle.	
15:20	14°58.879	145°36.647	3.0	12	Gn	Juv	Swimming	5	Coral, rock	Very small turtle.	
15:20	14°58.879	145°36.647	3.0	13	Gn	Adult	Swimming	6	Sand	Large turtle with small tail: likely female.	
15:28	14°58.905	145°36.615	4.0	14	Gn	Juv/Adult	Swimming	6	Coral, rock		
15:29	14°58.911	145°36.595	3.0	15	Gn	Juv	Resting	8	Coral overhang, sand		
15:32	14°58.960	145°36.577	3.4	16	Gn	Juv	Swimming	6	Rock		
15:34	14°59.030	145°36.530	3.4	17	Gn	Juv	Swimming	8	Coral, rock	Very small turtle.	
15:35	14°59.023	145°36.515	3.4	18	Gn	Juv	Swimming	6	Pavement		
15:37	14°59.008	145°36.455	3.4	19	Gn	Adult	Swimming	9	Rock, sand groove	Large turtle short tail: likely female.	
15:43	14°59.254	145°36.477	4.3	20	Gn	Juv	Swimming	11	Coral	Very small turtle.	
15:45	14°59.276	145°36.443	4.9	21	Gn	Juv	Resting	6	Coral	Under rock. Very small turtle.	
15:48	14°59.371	145°36.458	4.0	22	Gn	Juv	Swimming	5	Coral, rock		
15:52	14°59.419	145°36.347	4.0	23	Gn	Juv	Swimming	5	Sand		
15:54	14°59.431	145°36.234	4.0	24	Gn	Juv	Swimming	11	Coral, sand		
15:54	14°59.431	145°36.234	4.0	25	Gn	Juv	Swimming	11	Coral, sand		
15:54	14°59.431	145°36.234	4.0	26	Gn	Juv/Adult	Swimming	11	Coral, sand		
15:54	14°59.431	145°36.234	4.0	27	Gn	Juv/Adult	Swimming	11	Coral, sand		
15:56	14°59.431	145°36.234	4.0	28	Gn	Juv/Adult	Swimming	9	Coral	Large turtle short tail: likely female.	
15:56	14°59.431	145°36.234	4.0	29	Gn	Adult	Swimming	9	Coral	Under coral.	
15:57	14°59.431	145°36.234	4.0	30	Gn	Juv/Adult	Resting	11	Coral	Under coral.	
16:00	14°59.437	145°36.151	4.0	31	Gn	Juv	Resting	8	Coral	Algae collected.	
16:03	14°59.430	145°36.011	3.4	32	Gn	Juv	Feeding	9	Sand, rock, coral		
16:11	14°59.416	145°35.943	4.0	33	Gn	Juv/Adult	Swimming	11	Coral		
16:16	14°59.366	145°35.787	3.7	34	Gn	Juv/Adult	Swimming	15	Boulder, sand		
16:16	14°59.366	145°35.787	3.7							STOP: End at Barcinas Point, north.	
Tot. Time (hrs:mins)					Obs. Species	Size	Estimated	Number of Turtles	Observed	Transect	Turtles
1:29					18	Gn	Juv	18	Gn	Length (km)	per km
					11	Gn	Juv/Adult	11	Gn	3.025	11.2
					5	Gn	Adult	5	Gn		
					34	Gn		34	Gn		

Summary:
Max. Time
(hrs:mins)
1:32

Tot.		Total Estimated Number of Turtles Observed			Tot. Transect	Turtles
Obs.	Species	Size			Length (km)	per km
29	Gn	Juv	29	Gn	3.025	16.2
14	Gn	Juv/Adult	14	Gn		
6	Gn	Adult	6	Gn		
49	Gn		49	Gn		

Conclusion: Green turtles noted in abundance within this region, especially along the shallow transect. Additional surveys covering different hours, moon, tide phases and months are needed to confirm preliminary findings, determine variability, and establish peak times of abundance. Capture and tagging of turtles might be possible by hand if experienced fishermen employed working off a boat. Nighttime captures might be feasible given appropriate oceanic conditions. Tangle nets might be employed to capture turtles in the Barcinas region. Leprosarium portion of transect has 14.5 turtles per km; Barcinas has 18.9 turtles per km.

Date: 03/15/01

Type: Tow

Location: Puntan Lamanibot Sanhilo to Puntan Diaplo (North Barcinas), West Tinian

Site Description:

Lamanibot Bay is roughly 1.8 km long and 0.625 km in width. Shoreline cliffs vary from 10 to 40 m high. The coast is rocky with numerous large boulders. A fringing reef approximately 90 m in width (Eldredge and Randall 1980) supports numerous species of coral and algae. Coral cover approaches 40 % in some areas. The substrate slopes gradually from the inner bay reaching depths of 11 m 250 m from shore, 37 m depth just outside of the bay, and 183 m roughly 300 m further oceanward. Previous reports of turtles in the region include HA(1), Inc. (1985) and Wiles et al. (1989). Jones et al. (1974) collected algae from the region. Algae collected during tow survey. The Atgidon and Diaplo areas are characterized by convoluted limestone cliffs with heights seven to 15 m, narrow intertidal benches, eroded cliff caverns, and for the most part deep nearshore waters. Boulder zones and shallow fringing reef/pavement are present in some areas. The substrate is mainly steeply sloping pavement with scattered corals and algae. No streams observed to enter the region. Swell one to two meters. Winds light. Limited photos available.

Access:

Travel time by boat (31 ft. DPS Fountain) approximately 20 to 25 minutes. Road access at Puntan Lamanibot Sanhilo and Fleming Point described elsewhere. The main paved road towards Puntan Tahgong is taken north, and various side roads can be taken towards shore. Broad access from land appears limited by thick forest and a lack of back roads.

Description of Methodology:

Two boats (31 ft. Fountain and a 14 ft. whaler) were used in this survey. Two people were towed in back of each boat, with the whaler surveying shallower environments maintaining distances from shore approximately 50 to 150 m, and the Fountain surveying deeper environments 30 to 50 m offshore of the whaler. When a turtle was sighted the boat was stopped and the species, size, activity, time, depth and habitat characteristics were relayed to a recorder on the boat. Latitude and longitude were noted at the location where each turtle was encountered using a GPS unit (only one GPS unit was available). In addition, boat observers searched the waters surface for turtle ascents. Communication of turtle sightings between boats ensured multiple reports of individual turtles did not occur.

Personnel: Ray Aldan, Gus Dusalua, Henry King, Alfonso Reyes, Don Reyes, Elvin Masga, Jesse Pangelinan, Larry Ilo, John Manglona, Frank Rasa, Steve Kolinski

Source of Information:

Source information for Puntan Lamanibot Sanhilo and Fleming point are listed elsewhere. The other areas surveyed along this transect were not noted by Conservation Officers or fishermen for high turtle abundances. Jones et al. (1974) collected algae from Lamanibot Bay and south Puntan Diaplo. Both regions had species listed by Hirth (1997) as green turtle forage in other regions of the world.

Type: Tow

Observers: Ray Aldan, Jesse Pangelinan, Alfonso Reyes, Larry Ilo, John Manglona

Location: Puntan Lamanibot Sanhilo to Puntan Diaplo, Deep Transect

Tide: High falling, 2 days before half moon (neap) towards new.

Time	Lat.	Long.	Error		No.	Species	Size	Activity	Depth (m)	Habitat	Notes
			(m)	Obs.							
11:45	15°03.200	145°35.730	5.5								START: Dunk Coke northernmost point, rock extension.
11:57	15°03.031	145°35.882	3.7								STOP: Lunch, just inside bay at Lamanibot.

Time	Lat.	Long.	Error Obs.		Species	Size	Activity	Depth (m)	Habitat	Notes
			(m)	No.						
12:33	15°03.031	145°35.882	3.7	1	Gn	Juv	Swimming	18	Sand	START.
13:08				2	Gn	Juv	Swimming	18	Hardpan	South end of Dunk Coke. Very small turtle.
13:46				3	Gn	Juv	Resting	18	Hardpan	Very small turtle.
13:51				4	Gn	Juv	Resting	23	Sand	Very small turtle.
14:30				5	Gn	Juv	Resting	20	Hardpan	Very small turtle.
14:34				6	Gn	Juv	Swimming	15	Hardpan, sand	
14:36				7	Gn	Juv	Resting	18	Hardpan	Very small turtle.
14:56				8	Gn	Juv	Swimming	15	Hardpan	
14:58				9	Gn	Juv	Surface	15	Coral	
15:02	14°59.369	145°35.834	3.4							STOP
Tot. Time										
(hrs:mins)										
2:41										
Tow										
Observers: Gus Dusalua, Don Reyes, Elvin Masga, Frank Rasa, Steve Kolinski										
Location: Puntan Lamanibot Sanhilo to Puntan Diaplo, Shallow Transect										
Tide: High falling, 2 days before half moon (neap) towards new.										
Time	Lat.	Long.	Error Obs.		Species	Size	Activity	Depth (m)	Habitat	Notes
			(m)	No.						
11:45	15°03.200	145°35.730	5.5	9	Gn	Juv				START: Dunk Coke northernmost point, rock extension.
11:47	15°03.144	145°35.763	7.9	1	Gn	Juv/Adult	Surface		White wash area	Observed inshore from boat, inside Lamanibot bay.
11:48	15°03.113	145°35.861	3.7	2	Gn	Juv	Feeding	8	Hardpan with algae	Inside Lamanibot bay. Algae sample collected.
11:50	15°03.113	145°35.861	3.7	3	Gn	Juv	Feeding	8	Hardpan with algae	Inside Lamanibot bay. Algae sample collected.
11:57	15°03.031	145°35.882	3.7							STOP: Lunch, just inside bay at Lamanibot.
12:33	15°03.031	145°35.882	3.7							START.
12:40	15°03.012	145°35.893	4.3	4	Gn	Juv	Swimming	5	Coral, sand	Very small turtle (approx. 40 cm.).
12:49	15°02.620	145°35.806	4.0							
12:59	15°02.310	145°35.540	3.7	5	Gn	Juv	Swimming	8	Coral	Very small turtle (approx. 45 cm.).
13:05	15°02.297	145°35.360	7.6	6	Gn	Juv	Swimming	8	Coral, hardpan	Very small turtle (approx. 45 cm.).
13:06	15°02.260	145°35.276	4.0	7	Gn	Juv	Swimming	15	Hardpan	
13:09	15°02.172	145°35.272	3.7	8	Gn	Juv/Adult	Swimming	18	Hardpan	Outside Lamanibot Bay
13:27	15°01.530	145°35.067	2.1	9	Gn	Juv	Swimming	12	Hardpan	
13:34	15°01.406	145°35.021	3.4							End of Flemming Point Grotto.

Time	Error		Lat.	Long.	Obs.		Species	Size	Activity	Depth (m)	Habitat	Notes
	(m)	(m)			No.							
13:44	5.8		15°01.012	145°34.910								Tali Point.
13:45	5.8		15°01.012	145°34.910	10		Gn	Juv	Swimming	21	Hardpan	
13:45	5.8		15°01.012	145°34.910	11		Gn	Juv	Feeding	21	Hardpan	
13:47	3.7		15°00.953	145°34.922	12		Gn	Juv	Resting	21	Hardpan	
14:12	4.3		15°00.322	145°35.196	13		Gn	Juv	Resting	14	Hardpan, algae	End of Tali Point.
14:27	4.0		14°59.697	145°35.092	14		Gn	Juv	Swimming	12	Hardpan	
14:34	3.7		14°59.513	145°35.390	15		Gn	Juv	Resting	15	Hardpan	
14:34	3.7		14°59.513	145°35.330	16		Gn	Juv	Swimming		Surface	Very small turtle (approx. 40 cm.).
14:37	5.8		14°59.536	145°35.366	17		Gn	Juv	Swimming	12	Rock overhang	Very small turtle (approx. 45 cm.).
14:40	4.9		14°59.504	145°35.392	18		Gn	Juv	Swimming	2	Ledge	Very small turtle (approx. 35 - 40 cm.).
14:41	3.7		14°59.468	145°35.386	19		Gn	Juv	Swimming	15	Hardpan	Very small turtle (approx. 40 - 45 cm.).
14:47	4.0		14°59.389	145°35.522	20		Gn	Juv	Swimming	12	Hardpan	Very small turtle (approx. 40 - 45 cm.).
14:50	4.0		14°59.395	145°35.605	21		Gn	Juv	Swimming	18	Hardpan	
14:54	3.7		14°59.377	145°35.616	22		Gn	Juv/Adult	Resting	15	Boulder	Resting between boulders.
14:58	4.6		14°59.373	145°35.136	23		Gn	Juv	Swimming	20	Boulder	
15:02	3.4		14°59.369	145°35.834	24		Gn	Juv/Adult	Swimming	18	Rock	
15:02	3.4		14°59.369	145°35.834								STOP.
Tot. Time (hrs:mins)	2:41											

Obs.		Species		Size		Estimated Number of Turtles Observed		Transect Length (km)		Turtles per km	
20	Gn	20	Gn	Juv		20	Gn	9.625		2.5	
4	Gn	4	Gn	Juv/Adult		4	Gn				
24	Gn	24	Gn			24	Gn				

Summary:

Max. Time (hrs:mins)
2:41

Tot.		Species		Size		Total Estimated Number of Turtles Observed		Tot. Transect Length (km)		Turtles per km	
Obs.	Gn	29	Gn	Juv		29	Gn	9.625		3.4	
4	Gn	4	Gn	Juv/Adult		4	Gn				
33	Gn	33	Gn			33	Gn				

Conclusion:

There were a few localized areas where turtles were found in relatively high abundance, including Puntan Lamanibot Sanhilo. Lamanibot Bay had 2.8 turtle per km. The rest of the transect had 3.6 turtles per km. Additional surveys covering different hours, moon, tide phases and months are needed to confirm preliminary findings, determine variability, and establish peak times of abundance. Capture and tagging of turtles might be possible by hand if experienced fishermen employed working off a boat. Nighttime captures might be feasible given appropriate oceanic conditions. At least six very small turtles (35 to 45 cm) observed.

Date: 03/13/01
Type: Cliffline
Location: Fleming Point, Atgidon, West Tinian

Site Description:

Six cliffline stations spread out along the shoreline. Convoluted limestone cliffs 10 to 15 m above sea level. Few intertidal benches evident. The majority of the cliffline undercut into caverns at waters edge. Limited reef extension (up to eight meters) with the exception of site (1) where shallow (seven meter) reef pavement extends roughly 30 m from shore. This region is marked with a buoy for mooring dive boats. Nearshore depths are extremely deep with pavement dropping to depths exceeding 50 m very close to shore. Map bathymetry suggests depths exceeding 182 m 375 m offshore. No stream entrances noted within the region. Ocean conditions calm with swell < 0.2 m and winds light to nonexistent. Photos available.

Access:

The main paved road towards Puntan Tahgong is taken north, and then a grass and gravel back road off the left backtracks through forest. Room for parking is available on the side of the road, however a 10 minute hike through forest and then across sharp convoluted limestone is necessary to reach the shoreline. Travel time by car from San Jose estimated at 40 minutes. Travel time by boat (31 ft. DPS Fountain) approximately 20 minutes. The roads and paths are fairly well used as the area is popular to fishermen.

Description of Methodology:

Cliffline observers sketched the shoreline and submerged benthic features within their range of visibility. When a turtle was sighted on the surface or swimming subsurface, the time was noted and binoculars were used to identify species and estimate size. Features such as tail length and any identifying marks were recorded when observed. The estimated surface time and behavior of each turtle was noted when possible, and the location and/or route of each turtle was plotted on the area map sketch and numbered. The location of each observer was measured using a Garmin handheld GPS unit. Environmental conditions and location factors deemed relevant were recorded.

Personnel:

Henry King, Alfonso Reyes, Don Reyes, Elvin Masga, Jesse Pangelinan, Larry Ilo, John Mangiona, Frank Rasa, Steve Kolinski

Source of Information:

This location was suggested by Conservation Officers who noted reports of turtles by fishermen.

Location: Fleming Point (1): reef outcrop with buoy
Observer: Alfonso Reyes, Steve Kolinski
Time **Obs. No.** **Species** **Size** **Notes** **Tide:** Low falling, 3 days past full moon (spring). **Lat.** 15°01.050 **Long.** 145°34.939 **(+/- 4.3 m)**

15:20				START	
16:18	1	Gn	Juv	Approx. 70 cm. Surfaced 35 meter from shore for 2 mins.	
16:20	2	Gn	Juv	Surface 50 meters from shore for 1 min.	
16:38				STOP	

Tot. Time (hrs:mins)	Obs.	Species	Size	Estimated Number of Turtles Observed		Transect Length (km)	Turtles per km
				2	Gn		
1:18	2	Gn	Juv		Juv	0.060	33.3

Fleming Point (2)									
Location:	Don Reyes, Jesse Pangelinan								
Observer:	Obs. No.	Species	Size	Notes	Tide: Low falling, 3 days past full moon (spring).	Lat. 15°01.093	Long. 145°34.954	(+/- 4.6 m)	
Time				START					
15:15				STOP					
Tot. Time									
(hrs:mins)									
1:15									
	Obs.	Species	Size	Estimated Number of Turtles Observed					Turtles per km
	0			0					0.0
Fleming Point (3)									
Location:	Henry King, John Manglona								
Observer:	Obs. No.	Species	Size	Notes	Tide: Low falling, 3 days past full moon (spring).	Lat. 15°01.106	Long. 145°34.963	(+/- 4.0 m)	
Time				START					
15:24				STOP					
Tot. Time									
(hrs:mins)									
1:16									
	Obs.	Species	Size	Estimated Number of Turtles Observed					Turtles per km
	0			0					0.0
Fleming Point (4)									
Location:	Elvin Masga								
Observer:	Obs. No.	Species	Size	Notes	Tide: Low falling, 3 days past full moon (spring).	Lat. 15°01.128	Long. 145°34.962	(+/- 4.0 m)	
Time				START					
15:13				STOP					
Tot. Time									
(hrs:mins)									
1:17									
	Obs.	Species	Size	Estimated Number of Turtles Observed					Turtles per km
	0			0					0.0
Fleming Point (5)									
Location:	Larry Ilo								
Observer:	Obs. No.	Species	Size	Notes	Tide: Low falling, 3 days past full moon (spring).	Lat. 15°01.150	Long. 145°34.971	(+/- 4.0 m)	
Time				START					
15:13				STOP					
Tot. Time									
(hrs:mins)									
1:17									
	Obs.	Species	Size	Estimated Number of Turtles Observed					Turtles per km
	0			0					0.0

Location:	Fleming Point (6)				Lat. 15°01.191	Long. 145°34.987	(+/- 3.7 m)
Observer:	Frank Rasa						
Time	Obs. No.	Species	Size	Notes	Tide: Low falling, 3 days past full moon (spring).		
15:40				START			
16:45				STOP			
Tot. Time							
(hrs:mins)	Obs.	Species	Size	Estimated Number of Turtles Observed	Transect Length (km)	Turtles per km	
1:05	0			0	0.060	0.0	
Summary:							
Max. Time	Tot. Obs.	Species	Size	Total Estimated Number of Turtles Observed	Tot. Transect Length (km)	Turtles per km	
(hrs:mins)	2	Gn	Juv	2 Gn Juv	0.360	5.6	
1:18							

Conclusion: Few turtles were observed in this region in both shoreline and tow surveys. Additional surveys covering different hours, moon, tide phases and months are needed to confirm preliminary findings, determine variability, and establish peak times of abundance. Efforts at tagging turtles at this site are not recommended at this time.

Date: 03/13/01
Type: Cliffline
Location: North Dunk Coke, Puntan Lamanibot Sanhilo, West Tinian

Site Description:

Four cliffline stations spread out along the shoreline. Cliffs vary from low lying convoluted limestone four to 10 m above sea level outside of Lamanibot Bay to grassy flat-topped 10 to 30 plus m tall cliffs along the northern edge of the inner bay. Narrow intertidal benches extending five to seven meters are found along shoreline outside of the bay. Fallen boulders and reef border the cavernous undercut cliff water interface within the inner northern region of the bay. Nearshore waters reach 11 m depths 125 m from shore and 37 m roughly 300 m from shore at the tip of Puntan Lamanibot Sanhilo. The substrate is mainly limestone pavement with scattered corals and algae. The inner bay of the Dunk Coke area is characterized by a shallower reef zone of pavement, boulders, scattered corals and algae. Lamanibot Bay is roughly 1.8 km long and 0.625 km in width. Depths approach 37 m just outside of the bay, and 183 m roughly 300 m further oceanward. Previous reports of turtles in the region include HA(I), Inc. (1985) and Wiles et al. (1989). Jones et al. (1974) collected algae from the region. Algae collected during tow survey. No stream entrances noted within the region. Ocean conditions calm with swell one meter and winds light. Photos available.

Access:

The main paved road towards Puntan Tahgong is taken north, and then a grass and gravel back through forest leads to the shoreline (4WD recommended though not necessary). Travel time by car from San Jose estimated at 25 minutes. Travel time by boat (31 ft. DPS Fountain) approximately 25 minutes. The roads and paths are fairly well used as the area is popular to fishermen.

Description of Methodology:

Cliffline observers sketched the shoreline and submerged benthic features within their range of visibility. When a turtle was sighted on the surface or swimming subsurface, the time was noted and binoculars were used to identify species and estimate size. Features such as tail length and any identifying marks were recorded when observed. The estimated surface time and behavior of each turtle was noted when possible, and the location and/or route of each turtle was plotted on the area map sketch and numbered. The location of each observer was measured using a Garmin handheld GPS unit. Environmental conditions and location factors deemed relevant were recorded.

Personnel:

Henry King, Jesse Pangelinan, Larry Ilo, John Manglona, Frank Rasa, Steve Kolinski

Source of Information:

This location was suggested by Conservation Officers who noted reports of turtles by fishermen. Green turtles have also been reported in this region by HA(I), Inc. (1985) and Wiles et al. (1989). Jones et al. (1974) collected algae from the region which have listed by Hirth (1997) as green turtle forage in other areas of the world.

Location: North Dunk Coke (1)
Observer: Larry Ilo, Steve Kolinski

Time	Obs. No.	Species	Size	Notes	Tide
17:28				START	
17:48	1	Gn	Juv		
18:15	2	Gn	Juv		
18:35	3	Gn	Adult	Swimming on surface. Long tail visible.	
18:43				STOP	

Lat. 15°03.111 **Long.** 145°35.834 (+/- 3.4 m)

Tide: Low rising, 3 days past full moon (spring).

Tot. Time (hrs:mins) 1:15	Obs.		Species	Size	Estimated Number of Turtles Observed			Transect Length (km) 0.250	Turtles per km 12.0
	2	Gn	Juv		2	Gn	Juv		
	1	Gn	Adult		1	Gn	Adult		
	3	Gn			3	Gn			

Location: North Dunk Coke (2)
Observer: Henry King, John Manglona
Time 17:25
17:34
17:41
18:00
18:27

Obs. No.	Species	Size	Notes	Tide:
1	Gn	Juv	START	Low rising, 3 days past full moon (spring).
2	Gn	Adult	Surfaced 23 m from shore in 9 m depth water for 3 mins.	
3	Gn	Adult	Very large turtle with small tail surfaced 10 m from shore for 30 secs.	
			Very large turtle with small tail surfaced over deep water for 1 min. May be turtle # 2.	
			STOP	

Lat. 15°03.126 Long. 145°35.808 (+/- ? m)

Tot. Time (hrs:mins) 1:02	Obs.		Species	Size	Estimated Number of Turtles Observed			Transect Length (km) 0.150	Turtles per km 13.3
	1	Gn	Juv		1	Gn	Juv		
	2	Gn	Adult		1	Gn	Adult		
	3	Gn			2	Gn			

83 Location: North Dunk Coke (3)
Observer: Jesse Pangellinan
Time 17:25
17:35
18:00
18:04
18:18
18:30

Obs. No.	Species	Size	Notes	Tide:
1	Gn	Juv	START	Low rising, 3 days past full moon (spring).
2	Gn	Juv	Surfaced roughly 15 m from shore.	
3	Gn	Adult	Surfaced roughly 10 m from shore.	
4	Gn	Juv/Adult	Larger turtle with long tail (male) surfaced roughly 17 m from shore. Later believed noted by Larry and Steve.	
			Larger turtle with no noticeably long tail surfaced roughly 15 m from shore.	
			STOP	

Lat. 15°03.165 Long. 145°35.784 (+/- 3.4 m)

Tot. Time (hrs:mins) 1:05	Obs.		Species	Size	Estimated Number of Turtles Observed			Transect Length (km) 0.100	Turtles per km 30.0
	2	Gn	Juv		2	Gn	Juv		
	1	Gn	Juv/Adult		1	Gn	Juv/Adult		
	1	Gn	Adult						
	4	Gn			3	Gn			

Location: North Dunk Coke (4)
Observer: Frank Rasa
Time 17:35
18:42

Obs. No.	Species	Size	Notes	Tide:
			START	Low rising, 3 days past full moon (spring).
			STOP	

Lat. 15°03.209 Long. 145°35.826 (+/- 4.6 m)

Tot. Time (hrs:mins)	Obs.	Species	Size	Estimated Number of Turtles Observed	Transect Length (km)	Turtles per km
1:07	0			0	0.070	0.0

Summary:

Max. Time (hrs:mins)	Tot. Obs.	Species	Size	Total Estimated Number of Turtles Observed	Tot. Transect Length (km)	Turtles per km
1:15	5	Gn	Juv	5	0.570	14.0
	1	Gn	Juv/Adult	1		
	4	Gn	Adult	2		
	10	Gn		8		

Conclusion: Green turtles evident within this region. Feeding activities have been observed. Additional surveys covering different hours, moon, tide phases and months are needed to confirm preliminary findings, determine variability, and establish peak times of abundance. Capture and tagging of turtles might be possible by hand if experienced fishermen employed working off a boat. Nighttime captures might be feasible given appropriate oceanic conditions.

Date: 03/15/01
 Type: Tow
 Location: Lamlam to Dunk Coke, Puntan Lamanibot Sanhilo, West Tinian

Site Description:

Shoreline is characterized by low lying limestone rock five meters above sea level and two beaches, Unai Babui and Unai Chulu, which reportedly host nesting green turtles (Wiles et al. 1989, Pultz et al. 1999). The beaches measure roughly 480 m and 170 m respectively, and are made up of sand and gravel (Eldredge and Randall 1980). Benches occur at various areas along the shoreline. Shallow reef pavement with scattered live corals (very abundant at places) and algae fringe the coast. Accumulated sand deposits cover benthic regions offshore of the beaches. Depths of 11 m are suggested by map bathymetry to exist 100 to 325 m offshore. Depths exceeding 27 m are found 275 to 500 m offshore. No streams were observed to enter the region. Algae samples collected from Unai Chulu. Swell one to two meters. Winds brisk. Strong southward current. Visibility 35 plus meters. Limited photos available.

Access:

The area is easily accessible by boat with travel time from Tinian Harbor estimated at 25 to 30 minutes (DPS 31 ft. Fountain). Land access is limited pretty much to the beach areas. A gravel turnoff from the paved road north ends at Unai Chulu where parking is available. Unai Babui was not approached by land in this survey, however there appears to be a back road leading to the region. Thick forest makes access from other land areas difficult.

Description of Methodology:

Two boats (31 ft. Fountain and a 14 ft. whaler) were used in this survey. Two people were towed in back of each boat, with the whaler surveying shallower environments maintaining distances from shore approximately 50 to 150 m, and the Fountain surveying deeper environments 30 to 50 m offshore of the whaler. When a turtle was sighted the boat was stopped and the species, size, activity, time, depth and habitat characteristics were relayed to a recorder on the boat. Latitude and longitude were noted at the location where each turtle was encountered using a GPS unit (only one GPS unit was available). In addition, boat observers searched the waters surface for turtle ascents. Communication of turtle sightings between boats ensured multiple reports of individual turtles did not occur.

Personnel:

Ray Aldan, Gus Dusalua, Henry King, Alfonso Reyes, Don Reyes, Elvin Masga, Jesse Pangelinan, Larry Ilo, John Manglona, Frank Rasa, Steve Kolinski

Source of Information:

There was no indication this region is well known for turtles, other than at Puntan Lamanibot Sanhilo (transect end point) and for green turtle nesting at Unai Chulu and Unai Babui (Wiles et al. 1989, Pultz et al. 1999).

Type: Tow

Observers: Ray Aldan, Jesse Pangelinan, Alfonso Reyes, Larry Ilo, John Manglona

Location: Lamlam to Puntan Lamanibot Sanhilo, Deep Transect

Tide: High rising, 2 days before half moon (neap) towards new.

Time	Lat.	Long.	Error (m)	Obs. No.	Species	Size	Activity	Depth (m)	Habitat	Notes
10:54	15°05.079	145°37.498		1	Gn	Juv	Swimming	15	Hardpan, sand	START: Lamlam region. Chulu area.
11:15						Adult	Swimming	18	Boulder, sand	
11:22						Juv	Swimming	18	Hardpan	
11:43	15°03.200	145°35.730		3	Gn				Dunk Coke.	
11:45								5.5		

Tot. Time
(hrs:mins)
0:51

Transect
Length (km)
4.975

Turtles
per km
0.6

Obs.	Species	Size	Estimated Number of Turtles Observed		
2	Gn	Juv	2	Gn	Juv
1	Gn	Adult	1	Gn	Adult
3	Gn		3	Gn	

Type: Tow

Observers: Gus Dusalia, Don Reyes, Elvin Masga, Frank Rasa, Steve Kolinski

Location: Lamlam to Puntan Lamanibot Sanhilo, Shallow Transect

Tide: High rising, 2 days before half moon (neap) towards new.

Error Obs.

Time	Lat.	Long.	Error (m)	No.	Species	Size	Activity	Depth (m)	Habitat	Notes
10:54	15°05.079	145°37.498								START: Lamlam region.
10:55	15°04.890	145°37.378	4.3	1	Gn	Juv	Swimming	9	Coral	
10:57	15°04.843	145°37.333	4.0	2	Gn	Juv	Swimming	11	Boulder	
10:58										Invasion beach, Unai Babui.
10:59	15°04.792	145°37.256	4.3	3	Gn	Juv/Adult	Resting	9	Sand	
11:02	15°04.714	145°37.144	3.7	4	Gn	Juv/Adult	Swimming	9	Coral, rock	
11:04	15°04.685	145°37.108	3.7	5	Gn	Juv	Swimming	10	Rocky	
11:08	15°04.519	145°36.938	3.7	6	Gn	Adult	Swimming	9	Rocky	Large male turtle with very large tail. Northern tip of Unai Chlulu.
11:20	15°04.431	145°36.857	4.0							
11:30	15°04.074	145°36.626	4.6							
11:45	15°03.755	145°36.324	4.9							
	15°03.200	145°35.730	5.5							

Tot. Time
(hrs:mins)
0:51

Transect
Length (km)
4.975

Turtles
per km
1.2

Obs.	Species	Size	Estimated Number of Turtles Observed		
3	Gn	Juv	3	Gn	Juv
2	Gn	Juv/Adult	2	Gn	Juv/Adult
1	Gn	Adult	1	Gn	Adult
6	Gn		6	Gn	

STOP: Dunk Coke rock extension.

Summary:
Max. Time
(hrs:mins)
0:51

Tot. Transect
Length (km)
4.975

Turtles
per km
1.8

Tot.	Obs.	Species	Size	Total Estimated Number of Turtles Observed		
5	Gn	Juv		5	Gn	Juv
2	Gn	Juv/Adult		2	Gn	Juv/Adult
2	Gn	Adult		2	Gn	Adult
9	Gn			9	Gn	

Conclusion: Turtles were not observed to be abundant along this transect. Additional surveys covering different hours, moon, tide phases and months are needed to confirm preliminary findings, determine variability, and establish peak times of abundance. Tagging efforts not recommended for this region at this time.

Aguijan Island

Date: 03/20/01
Type: Tow
Location: Aguijan Island

Site Description:

Aguijan (Goat Island) is a raised, steeply cliffed, 168 m high, nearly flat-topped limestone plateau approximately 7.2 km² in size located nine km southwest of Tinian. There are no beaches and bench development is limited. Submarine topography is characterized by steeply sloping pavement with scattered boulders and limited coral development around most of the island. Along the east coast an 18 m deep pavement platform extends roughly 300 m offshore and contains scattered corals, grooves and sand deposits. Along the west coast a topographically diverse platform connects Aguijan to Naftan Rock. This platform is characterized by limestone rock, live coral and sand, and reaches depths of from nine to 18 m. Visibility during the survey exceeded 60 m. Swell was less than one meter, with morning winds light. Shark attacks against humans are known for this area. Limited photos available.

Access:

Aguijan Island is easily accessible by boat from Tinian, although access to land requires permit approval. A ride on the DPS boat (31 ft. Fountain) takes roughly 30 to 40 minutes from San Jose, Tinian. A Japanese founded dock and stairway are present on the west side of the island. Dock access is limited by ocean conditions.

Description of Methodology:

Three people were towed behind the DPS 31 ft. Fountain boat which maintained a distance of approximately 50 to 100 m from shoreline or shallow reef areas. When a turtle was sighted the boat was stopped and the species, size, activity, time, depth and habitat characteristics were relayed to a recorder on the boat. Latitude and longitude were noted at the location where each turtle was encountered using a GPS unit. In addition, boat observers searched the waters surface for turtle ascents. Snorkel surveys along the outer barrier reef edge were not conducted due to time and safety considerations.

Source of Information:

Aguijan island is not known locally to host large numbers of turtles. Fishermen frequent the area.

Type: Tow

Observers: Ray Aldan, Wayne Villagomez, Henry King, Alfonso Reyes, Don Reyes, Elvin Masga, Jesse Pangelinan, Larry Ilo, John Manglona, Frank Rasa, Steve Kolinski

Location: Aguijan Island

Tide: High falling, 3 days past half moon (neap) towards new.

Time	Error				No.	Species	Size	Activity	Depth (m)	Habitat	Notes
	Lat.	Long.	(m)	Obs.							
10:00	14°52.067	145°34.449	7.9								START
10:00	14°52.013	145°34.473	7.6	1	Gn	Adult	Resting	18	Hardpan bench		Sex unknown. Approx. 90 - 100 cm. East.
10:00	14°52.013	145°34.473	7.6	2	Gn	Adult	Resting	18	Hardpan bench		Sex unknown. Approx. 90 - 100 cm. East.
10:03	14°51.983	145°34.534	7.3	3	Gn	Juv	Resting	17	Hardpan bench		Approx. 70 cm. East.
10:04	14°51.961	145°34.591	7.3	4	Gn	Juv	Swimming	11	Hardpan		Approx. 50 - 60 cm. East.
10:44	14°50.994	145°34.289	9.4								East side end of fishing base.
10:45	14°50.886	145°34.223	6.4	5	Gn	Juv	Resting	18	Hardpan		Approx. 50 cm. South.
10:49	14°50.834	145°34.158	6.7	6	Gn	Juv	Swimming	11	Hardpan		Approx. 40 cm. South.

Conclusion: Agujian appears to support tens of turtles, in contrast to larger islands like Tinian and Saipan where turtle abundances number in the hundreds. The vast majority of turtles around the island appear to be juveniles, although two adult sized turtles were observed. Further investigations might consist of repeated tows to monitor changes and variability in turtle numbers, sizes and locations. A focused assessment of food resources may help to determine whether food availability correlates with limited turtle abundance. Six very small turtles (35 to 45 cm) observed.

